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and
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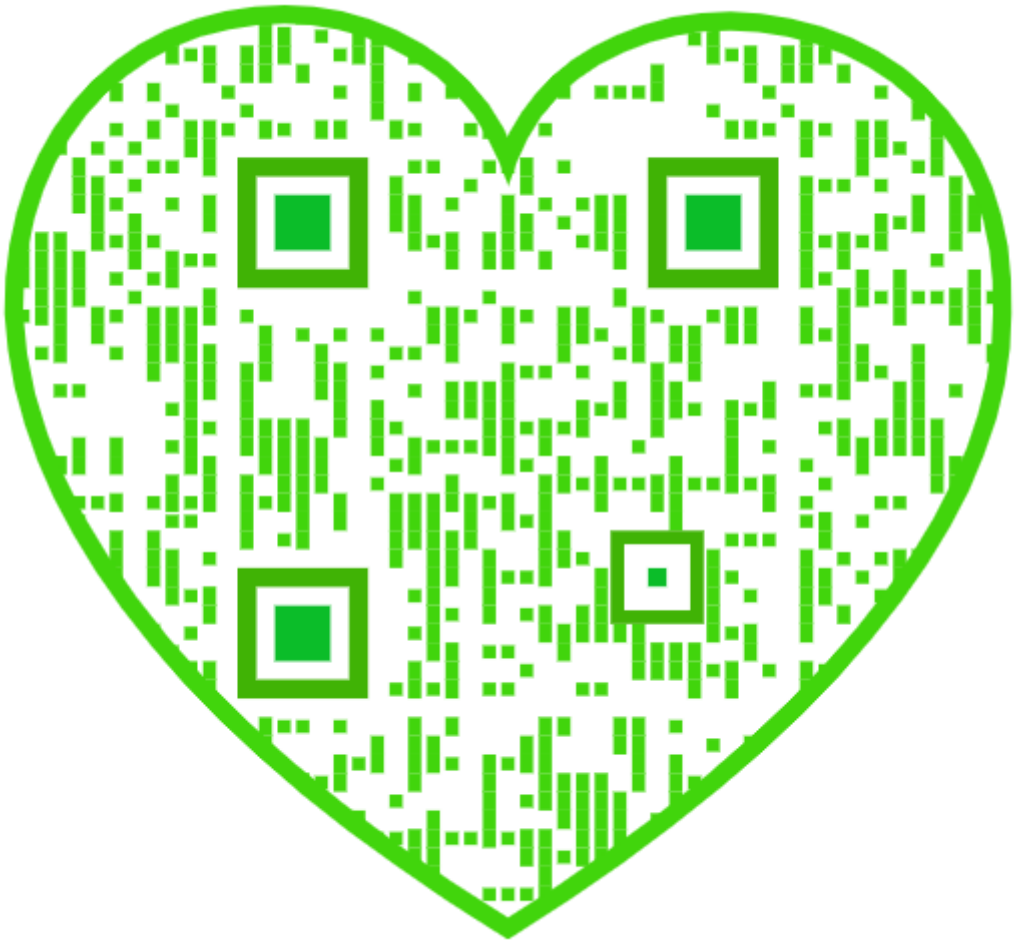

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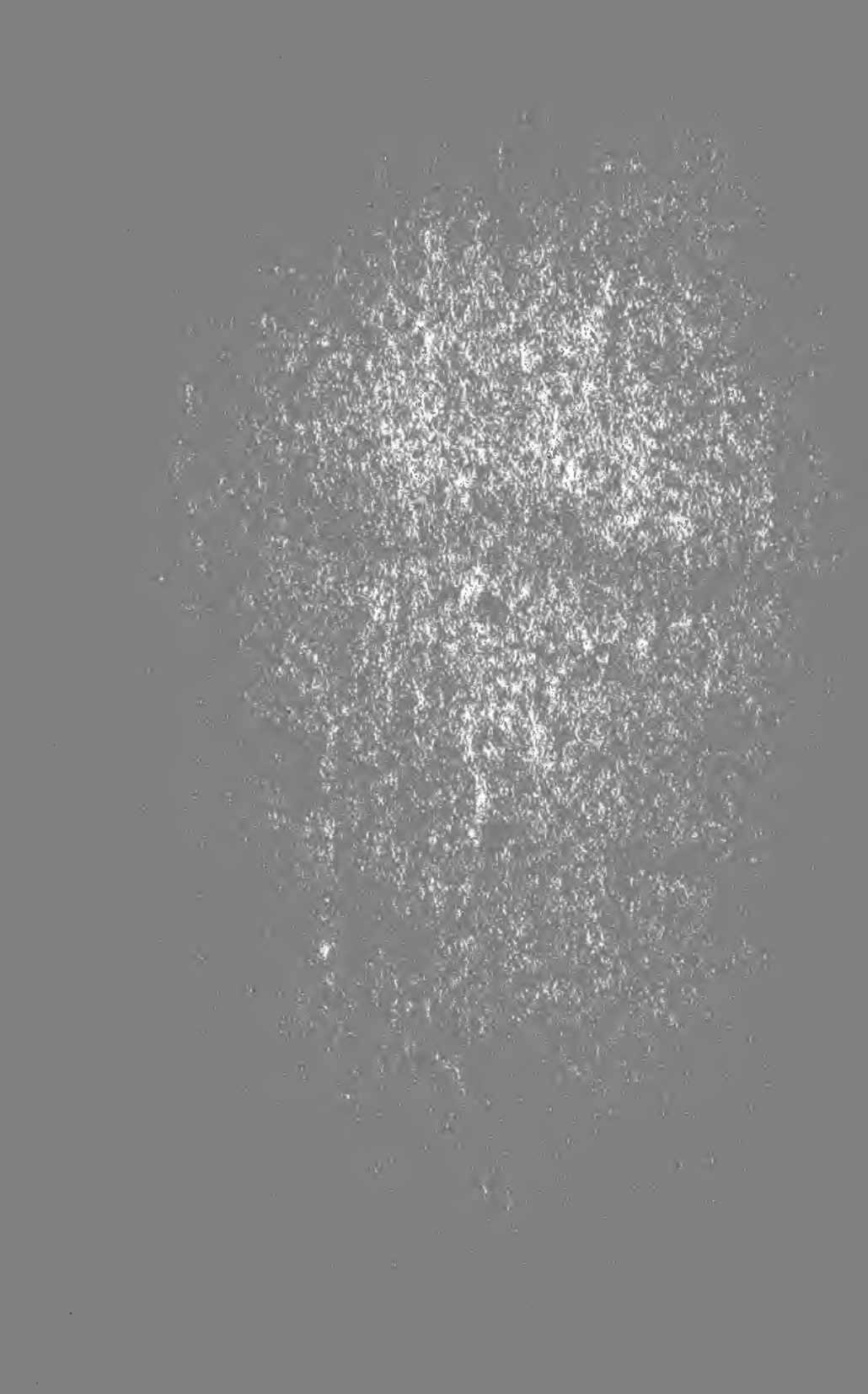

Teeth and Health

TEETH & HEALTH

William Beaham Brown

HOW TO LENGTHEN LIFE AND INCREASE HAPPINESS BY PROPER CARE

BY

THOMAS J. RYAN, D.D.S.

AND

EDWIN F. BOWERS, M.D.

G. P. PUTNAM'S SONS
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INTRODUCTION

A HUMAN being, for all ordinary purposes, is of value to himself and to the society in which he lives, only when he is alive, and in a reasonably good state of health.

If he is merely alive, and chronically filled with strange pains and alarming bodily disorders, he is an economic liability—to himself, his family, and to the society which must provide for his maintenance during hours or years of decreased productivity, or total incapacity.

Therefore it is that health, and the things that make for health, are the most important subjects with which human beings can concern themselves. And by the same token, and for the same reason, teeth, and the things that teeth do and become, must be the solicitous concern of everyone who values health, longevity, and physical and mental efficiency.

Yet it is only within the past few years—ac-

tually less than a decade—that the real significance of tooth decay, and of infections around the gum margins and the roots of the teeth, has been understood. Indeed, the whole matter is so new, the observation so recent, that it is the rare exception to find—outside of well-informed physicians and dentists—a single person who has any definite understanding of the vital necessity, for instance, of preserving the first, or deciduous, teeth. Or of the importance of the six-year molars—not only in helping to mould the shape of the jaws and face, but also in contributing to the proper nutrition of the brain—through their remarkable influence in maintaining the normal calibre of the lymphatics and blood vessels that go to supply the cranial centres.

It is almost unbelievable to many that the squeezing and contraction of these blood vessels—due to the abnormal change in the dental arch brought about by early loss of these important teeth—may be the actual cause of backwardness in school studies, delinquencies, degeneracies, and even of mental defectiveness.

Also, there are few laymen who can understand that the constant swallowing of pus from around

the roots of pyorrhœal teeth is an actual factor in the production of catarrh of the stomach and bowels—as well as digestive troubles of all kinds; that crippling attacks of rheumatism are distinctly traceable to "focal infection" areas at the roots of decayed teeth, or to a development of pus or necrotic material from an imperfectly-filled root canal, an improperly-fitted crown, or a defective piece of bridge-work.

Yet, that all these things—and many more—are true, is attested by competent and accurate observers everywhere—men who are devoting their lives to research work—as well as by dentists, putting the results of these scientific investigations into practical use, and "checking up" on the results.

Again, the fact that the teeth depend for their nutrition upon the food which is supplied for their development—not only during the life of the individual, but even during his prenatal existence —comes to thousands almost in the nature of a revelation.

It is one of those standing-the-egg-on-end propositions—perfectly simple and natural, when the connection is explained, but generally overlooked,

as so many other obvious things have been overlooked.

All these things, and many more important matters besides, have been brought out by my friend, Dr. Thomas J. Ryan, in this little book—which I consider one of the most important contributions to the cause of popular medical and dental knowledge of recent years.

It has been a pleasure and a privilege to collaborate with Dr. Ryan in the preparation of this work—which cannot fail to have a profound influence upon the generally enhanced conception of this very important subject.

Dr. Ryan speaks with authority on this matter. He is qualified, by years of the most varied experience, to deal with it from an eminently practical standpoint. A master in all that pertains to the mechanical side of his work, Dr. Ryan is, in addition, a profound student of the medical and physiological aspects of dentition—as well as in the paramount questions of diet, which he has so ably treated.

Dr. Ryan has made an exhaustive study of dental disease—particularly as it affects constitutional disease—and his superb technic in X-ray

diagnosis has been of immense aid in corroborating his almost uncanny knowledge of actual tooth conditions.

I have, for many years past, followed the results of his operative work, as it influences certain grave systemic disorders. And, while many of these results seem almost incredible, I speak from first-hand knowledge when I say that they are understated, rather than overstated, in the manuscript which I have had the privilege of editing and putting in book form.

I know, personally, the writer of the remarkable article which was printed in the *American Magazine*, under the caption "How I Found Health in a Dentist's Chair." I have seen this gentleman a hundred times since this article was written. In fact, it was through my urging that the writer of the article first consulted Dr. Ryan.

And I *know* that the marvellous improvement in his general condition of health is only an example of what Dr. Ryan, and scientifically trained, painstaking dentists everywhere, are accomplishing in equally grave conditions.

The medical profession—and the human race, in general—owes much to the labour of such men

as Dr. Ryan and his associates in the dental profession. They have written a page in the history of medicine which is altogether brilliant and glorious. It is a record of which any profession may well be proud

And so I believe that the great good they have done will live after them, while the halting efforts by which they gained their heights of achievement will be interred with their bones.

EDWIN F. BOWERS, M. D.

CONTENTS

		PAGE
	INTRODUCTION	v
CHAPTER		
I.	THE REAL MEANING OF TEETH	3
II.	TOOTH CARE COMMENCES WITH THE GRANDPARENTS	23
III.	WHY THE MOTHER SHOULD NURSE HER CHILD	29
IV.	WHAT MOTHERS SHOULD KNOW	38
V.	HELPING BABY WITH HIS TEETH	53
VI.	THE TEETH OF CHILDREN	67
VII.	HOW SUGAR SUCKS THE LIME OUT OF TEETH	83
VIII.	CROOKED TEETH AND TWISTED BRAINS	89
IX.	PYORRHŒA—ITS CAUSE AND CURE	109
X.	FOCAL INFECTIONS	123
XI.	TEETH AND HEALTH	154

Contents

CHAPTER		PAGE
XII.	Epilepsy may be Caused by Tooth-Decay	166
XIII.	Why we Need an X-Ray Examination	176
XIV.	How Zone Therapy Relieves Tooth Pains	186
XV.	Mouth Washes, Tooth Paste, Apples, and Toothbrushes	198
XVI.	The Dental Dispensary in Industry	217
XVII.	Free Dental Clinics—The Country's Greatest Need	228
	How I Found Health in a Dentist's Chair	247
	Index	259

Teeth and Health

Teeth and Health

CHAPTER I

THE REAL MEANING OF TEETH

THERE is more truth than humour in the cheap pun that says "one can be what one chews to be." We used to esteem the teeth more as adjuncts to a pleasant smile than as practical aids to long life. We regretted their loss more because of the conspicuous cavity their absence developed than because we believed them to be valuable in preserving health and happiness.

Teeth as Beautifiers. We realized, without any prompting, that no one could be quite as beautiful as Nature originally intended him to be if he suffered from a perceptible shortage of teeth—especially front teeth—or if he had a mouth full of crooked, overlapping snags—where he should

have had two rows of nice, clean, serviceable teeth.

His mouth would be noticeably out of harmony with the remainder of his features, and the entire facial appearance would be spoiled, as a consequence.

Talking through our Teeth. Furthermore, we recognize readily the function of teeth in helping to form speech. Even the most Demosthenean and agile-mouthed individual would be labouring under a terrible handicap if he tried to say "She slithered silently through the slippery slush," with only his toothless gums to help him through the task. He could no more "speak the speech trippingly" than he could crack any other kind of nuts.

Yet, it is only within a comparatively few years that we have come to realize the tyranny of teeth—especially bad teeth. We are only now, after a half a million years spent in sojourn upon this terrestrial sphere, learning the painful lesson that to spare the brush spoils the teeth—and sometimes the child, or the man or woman, who owns them.

Medical Men Co-operating to Preserve Teeth. And all over the country medical men and den-

tists are co-operating in perhaps the most important task of conservation in the world: they are awakening to the call of the child, and of the human race in general. Everywhere, dentists and physicians and enlightened men and women are aroused to the important question of dental prophylaxis (the prevention of caries, or tooth-decay), and to the loss of time, energy, and mental development due to lack of tooth-care.

You Can't Digest your Food unless you First Chew it. Science is now emphasizing the importance of teeth in preparing food for digestion. It is also calling attention to the very intimate connection between decayed teeth and a large number of diseases that apparently have nothing to do with teeth. A little reflection serves to show that improperly masticated food—improperly masticated because of bad teeth, or lack of teeth—is a primary cause of malnutrition, resulting in anæmia, neurasthenia, and the entire pernicious host of symptoms that follow chronic indigestion and auto-intoxication from intestinal absorption.

Tuberculosis May Have its Origin in Tooth-decay. Ulcers and cancers of the stomach have been traced to decayed teeth; so have rheumatism

and diseases of the kidneys. We are spending much time, money, and thought upon the subject of tuberculosis and its prevention; yet it does not occur to many of us that unquestionably a considerable number of cases of tuberculosis can be traced directly to the malnutrition which results from improper mastication of the food, or from the direct infection of foul mouths.

Many cases of mouth-breathing and adenoids arise because of the lack of a proper combination of brush, tooth-paste, and elbow grease—judiciously and persistently applied. Decayed teeth may cause disease in the ears and eyes, and various other unpleasant or dangerous conditions, more or less remote from the focus of infection. Ulcerated tonsils and swelling of the glands of the neck, and those very serious diseases of the cavities of the facial bones (sinus abscesses), develop quite frequently from infection of the teeth.

Teeth the Starting Point of Numerous Diseases. Almost every germ of a general infectious nature can be found in the cracks and crannies of hollow teeth—waiting and watching for a favourable opportunity to jump out and pounce

upon the insufficiently-protected or fatigue-weakened organism.

Measles and German measles, chicken-pox, whooping-cough, mumps, scarlet fever, diphtheria, influenza, and smallpox have bred in the fertile soil of decayed and neglected teeth, and have manifested their presence by starting the particular kind of trouble for which evolution has designed them.

What Dr. Osler Thinks of Teeth. So great an authority as Dr. Osler, one of the world's most competent medical men, declared without reservation that more diseases are brought about by neglected and decayed teeth than by excessive indulgence in alcoholic liquors, and that there is not one single thing more important to the public in the whole range of hygiene than the hygiene of the mouth.

Nor will any family investment have the economic importance, or earn more in the way of physical and mental dividends, than scrupulous care of the teeth, and prompt and efficient dental care.

Poor Teeth not Inherited. Yet, only in the rarest instances are poor teeth inherited. In fact,

we are coming to the conclusion that, unless there be a distinct scrofulous taint, or unless the mother, through improper diet, fails to provide for her child an adequate supply of lime salts, Nature creates all children free and equal, physiologically speaking. So bad teeth signify neglect, bad habits, uncleanliness, ignorance, and carelessness.

Forty Per Cent. of Absences from School Brought about by Tooth-decay. It is asserted that forty per cent. of all absences from school attendance are brought about because little Johnny or Susie has a previous engagement with a tooth-ache. This is very interesting, as it touches us in our most vulnerable spot, our pocketbooks. Taking New York City as an example, 67,000 children fail in promotion to higher grades each year, owing to deficient scholarship, blamable on compulsory absence from the classrooms. While 26,800 of them are kept from school on account of pain or ulceration in their teeth.

To teach the young idea how to shoot costs thirty-six dollars a year a youngster; so that when these children have to duplicate a year's work we lose a million dollars. The loss of that sum falls on the parents who have to pay the taxes. But

the greatest sufferer is the child himself, who not only has to bear the pain, but becomes apathetic and discouraged at his lack of progress, and seizes the first excuse for leaving school and swelling the ranks of unskilled workers.

Between the sixth and twelfth years—those golden years of satchel and shining morning face—the teeth are most helpless and dependent. During this period the first teeth are lost—their loss being accompanied by considerable decay—the permanent teeth meanwhile coming in. Tooth nutrition is interfered with by the pressure of the second tooth pushing outward. In addition to all this misery, the poisonous germs from diseased teeth lower the child's vitality, making him more susceptible to infectious diseases. This is one of the chief reasons why the children of the poor succumb more rapidly to these disorders than do the children of wealthier families. The poorer parents have no knowledge of dental prophylaxis. They know little or nothing of the necessity of keeping the mouth clean, and public health authorities, in general, have made little or no effort to dispel this ignorance. Consequently, disease germs find ready entrance into these unclean

mouths, and establish therein most favourable grounds for residence and propagation.

The most Important Tooth we Have. The first of the permanent teeth, the sixth-year molar, is by far the most important tooth we have. It is the keystone of the dental arch, and determines to a great extent the position of all the other teeth.

When it is lost, Nature makes a determined effort to close the vacant space. This usually results in foreshortening the jaw, and throws the entire articulation "out of joint." It is one of the chief causes of irregularity in the position of later teeth, and it may be here remarked that if these sixth-year molars were preserved as they should be, few children would ever develop "bird" or "fox" faces, or become mouth-breathers.

Efficiency Depends on Good Teeth. This brings us back to the question of teeth and efficiency. We know positively that efficiency depends upon teeth.

A short time ago an epoch-marking experiment was tried out in the Marion School in Cleveland, Ohio. It was contended by the chairman of the oral hygiene committee of the National Dental Association that thousands of children were

thrown yearly upon the scrap heap of deficiency, mediocrity, or crime because of a decrease in mental and physical deficiency, due to carious teeth. Permission was given by the Cleveland Board of Education for this committee to make an exhaustive experiment to determine once and for all whether there was any appreciable connection between teeth, morals, and brains.

The Marion School was selected for the reason that it seemed to offer least favourable conditions for any increase of efficiency. It is in a congested section of the city, packed with all grades of poverty, from the picturesque to the stolid and sordid. Every note in the gamut of misery and crime is sounded within hearing distance of this schoolhouse bell.

A general dental inspection of the entire school was made by ten dentists and their assistants, under the direction of the chairman.

Only Three out of 846 with Perfect Teeth. Out of 846 children examined, only three were found whose mouth conditions were perfect—one a little Slav girl, another a Russian boy, and the third a young coloured boy. Every other boy or girl in the school had cavities, or other evidences of

decay, or else had lost one or more permanent teeth, while dozens of cases of malformed jaws and faulty occlusion (improper alinement of the teeth on the biting surface) were noted.

Forty of the worst of these cases were selected. All the children were chosen from grades between the fourth and the eighth—for the reason that below the fourth they could not intelligently co-operate, and above the eighth they would be too soon graduated, so that the statistical value of the experiment would be lost. The test was to prove—if it was susceptible of proof—the efficacy of healthy mouth conditions, and their effect in maintaining a high order of physical and mental development.

All varieties of children were represented in this experimental class. Among them were some of good mentality. Others were of the poorest. A physician had pronounced one of the little girls a mental defective. There were tractable pupils, and there were incorrigibles. Three were truants on the verge of being taken into the Juvenile Court. One obstreperous and mischievous boy—whose sole object in life seemed to be to make trouble in the schoolroom and on the play-

grounds—already had his papers made out for transfer to Boys' School, a sort of reformed reformatory.

The forty children were assembled, and the intent of the experiment was explained to them. They were to consult their parents, and report as to whether or not they would be prepared to co-operate in the work. It was required that they should permit the official dentist to put their teeth in perfect condition—without charge, of course—then brush their teeth three times daily, brushes and tooth powder being furnished free.

Mending Brains through the Teeth. They were also to undergo a series of psychological tests—similar to those devised by Professor Kraepelin, in his epoch-marking studies as to the effects of alcohol upon the co-ordinating faculties and the work-ability of his subjects—and were to attend an occasional meeting.

As an added inducement, if they faithfully lived up to the requirements, each pupil was to receive a five-dollar gold-piece for Christmas. If they failed, they were to be dropped from the class.

After three days, when the second meeting was called, five children withdrew. The prospective

ordeal of having their teeth put in order, with the heavy burden of scrubbing them three times daily, was too much for them. So the remainder were instructed in the proper way of brushing the teeth; that is, with a rolling motion of the brush in an up and down direction, not across, and cleansing the inner as well as the outside surfaces. To be certain that no particles of food remained even after the most careful brushing, a thread of dental floss was to be passed between the teeth.

About this time Dr. Wallin, an expert psychologist, put the little band through a series of psychological experiments. These were calculated to test the memory, accuracy, quickness of perception, rapidity and precision of association of ideas, and rapid calculation. He made six tests—two before work was begun on the teeth, two when they were being treated, and two after a year had elapsed. The time and all technic and methods of the test were absolutely uniform.

These children were also taught how to chew their food properly, and the action of saliva was made clear to them. They were visited in their homes at irregular intervals, and their work was closely scrutinized. During the next few months

eight more were dropped for failing to carry out some essential of the test—neglect in brushing the teeth, food bolting, or washing down boluses of food with tea or water before they were completely masticated.

Every assistance was accorded the children in perfecting their oral conditions; but not one word was said to aid their mental condition, except as it concerned their mouth toilet. And nothing was done or said to single them out from the rest of the school. In fact, so unobtrusive was the work that many of the teachers had not the slightest idea as to which of their pupils were in the dental class. All improvement that was manifested could be definitely ascribed to oral hygiene alone.

An Astonishing Gain in Physical and Mental Ability. When, after a year of this régime, the final records were made by Dr. Wallin, the average gain in the psychological tests for the twenty-seven children was 99.8 per cent.—almost double what even the most optimistic of the committee had predicted it would be. Not only was the mental gain most pronounced, but distinct physical improvement was evident in every case, and a spirit of self-respect that seemed to overcome

the tendency toward truancy, disobedience, and incorrigibility had developed. The more the children had need of it, the more they seemed to improve.

One girl made the astonishing increase of 444 per cent., and another 101 per cent. Six of the pupils completed their thirty-eight weeks of school-work in thirty-four weeks, and one bright boy did two years' work in one year. Several girls who started the tests with sallow complexions and pimpled faces, at their conclusion had bright, clear eyes and skins and rosy cheeks. One child, who had suffered greatly from flatulency and sick headache, was entirely relieved.

This experiment, now noted in medical annals, proved conclusively that by keeping the teeth in perfect condition, and living up to the laws of mouth hygiene, twenty-seven children had almost doubled their mental ability, had gained in strength and in bodily and mental endurance, and had developed marked improvement in personal appearance and in their moral natures.

How Society Benefits by Adequate Tooth-care. None will deny that the community benefits economically and socially, when its children are

improved physically, mentally, and morally. So there should be no question as to the necessity of a nation-wide movement favouring oral prophylaxis, particularly when it is remembered that only eight per cent. of the total population of the United States has any conception of the value of teeth, or pay proper attention to them. The other ninety-two per cent. are content to suffer the pangs of toothache, and go through life with offensive breaths and unhealthy bodies—until they summon sufficient fortitude to have the teeth treated, filled, or else extracted.

More than seventy-five per cent. of all school children in the world suffer from some form of dental disease. And yet we are, in the main, neglecting this most important branch of preventive medicine. It is true that some of our more advanced cities are interesting themselves, to a greater or less degree, in the work, and the dentists—to their great honour as a hard-working, conscientious, and learned profession—are giving liberally of their time and thought in the effort. But the merest surface of the dental needs of the human race has thus far been touched. It will require years of education, with inconceivable tact

and patience, to drive home the idea that a clean tooth rarely or never decays; that no tooth ever can be too clean; and that no tooth should ever be extracted while there is the slightest hope of saving it to a life of usefulness.

Preserve the "Milk Teeth." Every parent should remember that the longer the "milk teeth" (the child's first teeth) can be kept, the more regular the permanent teeth will be, and the more perfect the shape of the mouth and jaws; also that the proper time to begin the toilet of the teeth is when they are still under the gums of the child. The care of a baby's mouth should begin when it is yet a nursling. Careful wiping with a piece of clean linen moistened in warm water will do wonders to keep tender gums in sound, healthy condition—and incidentally will sweeten the infant's breath.

At the mature age of two the use of a small and very soft toothbrush should be begun, and this should be continued until the child is 102. After that it will no longer be necessary to clean the teeth; but in all the intervening years cleanliness should be enforced—by martial law, if necessary.

It may also be remembered that during the

time the second teeth are coming in—between the ages of six and twelve—the child's jaws are as plastic as modelling clay, and if there are any irregularities in the growth of the teeth they can be corrected by a skilled dentist before they produce permanent disfigurement.

Straightening Brains through the Teeth. In that form of malocclusion where one or more teeth ramble off from the main herd in a forward or backward direction, or cut their way through the gums at the wrong places, a good orthodontist (as the dental specialist is called), with the aid of time, a few pieces of wire, and a gold band clamped on some of the teeth, can perform wonders. Almost any ordinary deformity, and many extraordinary ones, are corrected permanently by these experts.

Parents should also teach children to use all their teeth. Both sides of the mouth are equally in need of exercise. If one side is favoured at the expense of the other, the other will begin soon to show evidences of irregularity and decay.

Be very certain to scrub and rub, or if necessary have a dentist scale off or polish any and all brown spots when they first make their appearance;

otherwise they will soon become black spots, and a little later cavities.

It is also advisable to refrain from picking the teeth with a pin, a fork, or the point of a knife. Quill toothpicks only should be employed, or better still, dental floss.

The Lesson of the "Movie." The New York Dental Society has lately succeeded in having a regular system of instruction in mouth hygiene introduced into the public schools. To focus the pupils' attention and deepen the impression of the lesson, they are employing moving pictures to convey the moral and adorn the tale.

The first "movie" scene shows Mr. Jones with a grouch that is a cross between a bear with a sore head and a sudden-tempered gentleman who has just hit a thumb instead of a tack. Corporal Jones is a victim of toothache. He opens his mouth and shows where the ache comes from, after which he resumes being a grouch.

His little daughter Mary, after a most unenjoyable breakfast, goes to school, and there is introduced for the first time to a toothbrush and its use explained to her. A great light dawns upon Mary's horizon. She sees her father in his true

colours—not as a grumbling man hater, but as a martyr to aching teeth, plus exaggerated ideas as to how painful dentistry is.

Mary persuades Major Jones to go to a dentist—probably one who uses nitrous oxide and oxygen—and have his teeth put in order. So pleased is Colonel Jones with the results that he next orders the whole family off to the dentist. The final scene shows General Jones, beaming and happy, surrounded by his flock, also beaming and happy.

Insurance People also Looking into Teeth. Another indication of awakening public interest in dental prophylaxis is the fact that life insurance people are now looking into hollow teeth. They are finding out many things that will save them millions of dollars in death claims when they have completed their investigations and are ready to put their knowledge to practical uses.

Preventive dentistry has added not only to the length of life, but also to its breadth and depth, measured in terms of efficiency and happiness; and happiness, it will be remembered, Schopenhauer defines as freedom from pain.

Scientific dentists all over the world now believe that at least eighty per cent. of all dental troubles

can be prevented by properly caring for the teeth from infancy to old age. The day is rapidly approaching when a toothless, snaggle-jawed individual, with a prominent breath, or a lump on his face that resembles the rear elevation of a billiard ball, will be arrested on sight by the medical police, and rushed post haste to a dental clinic, there to be detained until he is once more fit to be at large among his fellow men. This is only fair to himself and to the society he infests.

In those halcyon days to come we'll know more about the menace of dental infections. We shall understand better the necessity of prophylaxis, just as we now understand the necessity of segregating contagious diseases. And with these things in mind we'll not only be able, but we'll be very willing to put into practical application our knowledge of the intimate relations existing between teeth and health. For we will have discovered, and profited by, our rapidly increasing knowledge as to the real and fundamental meaning of teeth.

CHAPTER II

TOOTH CARE COMMENCES WITH THE GRANDPARENTS

OLIVER WENDELL HOLMES has told us that the education of the child logically commences with the grandparents. By the same token the nutrition of the teeth commences logically with these same revered individuals.

Poor Teeth Largely Due to Poor Food. For poor teeth are largely the result of inadequate food, and consequent poor nutrition—not only of the individual himself, but also of his parents, and perhaps also his grandparents.

Indeed, I do not believe it is possible to overemphasize the importance of the fact that tooth-decay and tooth loss could quite generally be prevented if the parents, and the individual himself, had eaten the proper kind of food.

I am convinced that if dentists everywhere would only teach this fact, and if medical and dental examiners in public schools could only be

made to realize the importance of this subject, and if they would educate both parents and school-children in regard to these deficiencies, much more could be accomplished than would be achieved by all the recommendations for hygienic care, and prophylaxis and decay-prevention that could possibly be inculcated.

Not Minimizing the Importance of Dental Cleanliness. I do not mean by this statement to minimize the value of prophylaxis or of dental cleanliness in general, nor of the excellent effects of unremitting devotion to the toothbrush. All these are splendid measures, and are accomplishing a wonderful amount of good. But, admirable as they are, they are only a means of locking the stable door after the theft of the equine. And the equine in this case is the tooth structure itself. This is robbed of phosphates and calcium, for the reason that children, as well as adults, are fed too much "pap," breakfast cereals and other demineralized food substances—including white bread, sugar, and meat—which latter is emphatically deficient in lime salts and other tooth-building material.

In fact, even vegetables, as they are ordinarily

cooked in this country today—with the skins removed and the valuable cell salts thrown down the kitchen sink—are lacking in these valuable substances.

Where Dentists Don't Go Far Enough. Of course, it cannot be denied that it is highly necessary for dentists to prescribe mouth-washes and tooth-pastes, and to give elaborate instructions for using dental floss and for brushing the teeth regularly—in just such a way. This is very important information, and fulfils a very important purpose.

But it would be much better if dentists everywhere would teach the people that the great cause of tooth-destruction lies principally in lime and phosphorus starvation, brought about by eating—from the time the mother first conceives the child, until the individual dies of old age—a diet robbed of its minerals, totally deficient in the lime and phosphorus necessary, not only to make teeth and bones, but also to make nervous systems and brains, and to keep the marvellous functions of nutrition—regulated by the activities of the ductless glands—from going awry, and making a mess of the whole organic structure—mental, physical, and moral.

Learning from Dr. McCollum's Rats. The epoch-marking work of Dr. E. V. McCollum, of the School of Hygiene and Public Health of Johns Hopkins University, has proved conclusively that the removal of the vital mineral salts from our wheat, sugar, and cereal grains is one of the most far-reaching and destructive influences that confronts the American people today.

Using rats and other small animals as subjects, Prof. McCollum demonstrated that these rodents could be sickened—and even killed—by feeding them exclusively on a diet deficient in certain of these elements essential to growth and nutrition.

It isn't the Teeth alone that are Robbed by Improper Food. And what is true of animals in the laboratory is equally, or more, true of human beings. Thousands of cases of nervous and physical disease—of every conceivable kind, ranging from scurvy and pellagra to indigestion and neuritis—are caused by nothing more or less than an improperly selected diet, or a diet in which there is a deficiency of mineral salts or other substances that have a profound effect, not only on the nutrition of tooth and bone structure, but on the very function of life itself.

Keep away from Refined Sugars. It is for this reason—more than because of the direct action of their acids upon the teeth—that I strongly urge mothers to withhold refined sugar, and candies made of refined sugar, from their children.

For these sugars, lacking in lime and iron and other mineral salts, by their capacity for selective affinity, abstract these salts from the bones and teeth and tissues, thereby weakening the child's vitality, and producing marked deterioration in all the structures of which they are essential constituents.

We Use too much Sugar anyhow. It must be remembered that every particle of starch consumed—in bread and in potatoes and other vegetables, must be converted into sugar before it can be utilized by the system to furnish heat and energy. So that normally, the child gets all the sugar he needs, anyhow.

However, if there is a craving for more, this can best be supplied either by brown, unrefined sugar or, "natural" molasses, or else by honey, maple syrup, and all forms of sweet fruit.

In fact, fruit furnishes, in its levulose and grape sugar, a rich and dependable source of energy.

Especially such fruits as dates, figs, and raisins—which are extra rich in food and fuel values—as well as in essential mineral salts. And all without any danger of undermining the tooth and bone nutrition, or the general health of your child.

Robust Health, Sound Teeth, and the Balanced Diet. So there can be no question as to the importance of an adequate diet—not only for the child, but also for its parents—in maintaining that proper balance of nutrition that makes for robust health, clear brains, red blood, steady nerves, and sound teeth.

CHAPTER III

WHY THE MOTHER SHOULD NURSE HER CHILD

THERE is only one source from which a child's physical and dental equipment can be obtained—and this is from its mother. This is why it is absolutely imperative that mothers should see to their own condition of nutrition—if they would have their child well nourished. For this will secure to the baby the necessary calcium salts from which to build its teeth and bones, as well as to provide the child with the best there is in the way of food—which best is food prepared as Nature intended it to be prepared.

Now, many mothers who are normally fit to nurse their babies fail to discharge this important duty, chiefly because they do not realize the grave results that this neglect of obligation may entail upon the child—not only for the immediate present, but for all the days of its life.

Better Teeth from Mother's Milk. Therefore,

it cannot be too strongly impressed upon mothers that the tooth and bone structure of their babies will suffer as a result of their defection. No social obligation of the mother should ever be permitted to interfere with her regular feeding of her child—from the maternal font—if the milk is adequate in richness and quantity, and if she is physically able to stand the strain of lactation.

If the milk is deficient in any essential qualities, the mother should see to it that she increases her available supply of a lacteal fluid, rich in mineral salts, by herself drinking liberal quantities of milk and chocolate, and by taking the vegetable oils—such as olive oil and mazola—which have been found particularly effective for increasing the milk supply.

Don't Cheat the Baby of Even Half its Food Supply. Even if the mother's milk should be deficient in amount, she should make every sacrifice to give her baby at least all she has. If she can supply only half the milk her child needs—supplementing the remainder with a good modification of certified cow's milk—there will be a fifty per cent. clear gain to the baby, anyhow. The

youngster will have this much advantage over the child fed exclusively on the bottle.

Pasteurized Milk not so Digestible. It should be clearly understood that any milk, provided from any source other than the mother herself—especially when pasteurized—or even heated to a temperature above body heat, undergoes a chemical change.

Its protein constituents, and the mineral salts so necessary to the development of the child's teeth and bone, as well as to his muscles and blood cells, become partly disorganized.

The casein is rendered more tough and difficult of digestion. It is not split up into the fine flocculent curds that Nature provides for the infant when its mother furnishes its milk.

This makes all the difference in the world in the development of the baby—and especially in the normal development of its teeth and bones.

Pasteurized Milk Better than Dirty Milk, but not as Good as Clean Milk. Of course, pasteurized milk is infinitely better than dirty, germ-infested milk, and the most elemental principles of common sense would dictate its use in preference to the use of milk that might produce disease.

But this does not alter the fact that clean, "raw" milk is a better food than "treated" milk, and that, if it can be secured it should always be used in its natural state.

Don't Wean Baby too soon. Nor should the baby be weaned as long as there is an edequate milk supply, nor as long as the arrangement does not unduly exhaust the mother.

For the baby, weaned too soon, and fed on a milk modification deficient in essential mineral salts, will develop rickets. Its bones will be softened, its teeth will erupt tardily and irregularly. Its muscles, deprived of the necessary lime salts, will twitch and quiver. Its nerves will be unstable.

On the other hand, many mothers, with that marvellous capacity for self-sacrifice characteristic of mothers—the touch-stone of the truest and tenderest love in all the world—nurse their little ones when the strain of lactation is almost disastrous to their own enfeebled constitutions.

Nothing more Wonderful in Life than Mother-love. They are literally robbing their very hearts' blood of its nutritive elements—pabulum that is vitally needed to repair and reinforce their own

debilitated physical structures—in order that the child of their flesh and bone may gain full measure of its natural sustenance.

While fully appreciating the beautiful mother-love that prompts the sacrifice, I yet feel that the best interests of all concerned are not served by the mother continuing to nurse her child after Nature's warning signal has been flashed.

For excessive lactation, or too long-continued nursing of a sturdy, robust youngster, tends, first and foremost, to depreciate both the quantity and the quality of the mother's milk; and next, to rob her of vital force and nutrient material which should be utilized for cell reconstruction.

Danger in Drain on the Mother. This, if the mother should happen to be anæmic or run-down, might prove to be just that added amount of drain upon the system which would be very likely to predispose her toward tuberculosis, or the development of some wasting disease of far-reaching consequence.

And further, if there should happen to be other children, it would not be just to them, nor to society at large, for the mother to risk the imminent danger of a decline, or a serious depreciation

in her vitality and mother-efficiency, by continuing to nurse her last-born at the risk of imperilling her own health.

So, it would seem clear that the safe and sensible course to pursue in connection with this question is for the mother to build up her health and her milk-secreting power, by observing all the laws of hygiene and health that the exacting duties of a mother will let her observe.

How the Mother May Build Vitality. A liberal amount of good nourishing food, all the sleep that circumstances will allow her to get—and then a little more, if she can possibly steal it—and plenty of fresh air, day and night, are essential.

The diet may be supplemented by the milk-producing foods I have mentioned earlier in this chapter, great care being taken, however, not to derange the stomach by using fatty foods in excess of the ability of the system to transform and assimilate them.

Then there's Nothing Else to Do but Wean the Child. If, after a few weeks' test of this régime, the mother still finds her vitality on the wrong side of the physiological balance sheet, there is only one thing to do, and that is either to provide

a wet-nurse for the baby—a very difficult procedure nowadays, except for those in affluent circumstances—or else to put the baby on a carefully modified formula of clean, whole milk.

In another chapter I have gone somewhat extensively into this matter of milk modification. I would like here, however, to emphasize the fact that *any* milk modification is somewhat a matter of experiment. There is no accounting for idiosyncrasies—any more than there is for tastes—and what might agree splendidly with nine babies might completely upset the digestive apparatus of the tenth child.

When this rare incident occurs, it is necessary to keep on trying various formulas and modifications, until one is found that agrees perfectly with the child.

Agreeing with Eminent Medical Authorities. It is interesting to note the development of interest among the medical men in respect to this important question of the proper nutrition of teeth, and of the importance of the diet, in this connection.

In Dr. Albert Westlake's work on *Babies' Teeth to the Twelfth Year* he says:

Teeth and Health

Babies' teeth should receive consideration at least six months before the child is born. Necessary elements in the building up are furnished at this period by the mother's blood Hence, the need of the purity of the latter.

Teeth require organic phosphates (particularly phosphates of calcium as well as carbonates of lime) more than any other part of the body. Therefore, bone food is necessary for the mother (cow's milk, eggs—especially yolks—peas, beans, lentils, whole wheat, outer grains, etc.).

Why the Mother Needs to Watch her Diet. Dietetic treatment for the mother is very important at this period when the bone is forming.

The intestines of the child are also undergoing vital changes at this period and earlier. This includes primary fixation of the child's intestine in the left hypochondriac region.

It is, therefore, vital to the offspring to get perfect peristalsis of the mother's intestines. Elimination and evacuation should be regular without drugs.

Mothers especially Need *Real* Food. This is yet another reason why the mother should abstain from white bread, degerminated corn-meal, "breakfast foods" which do not contain the entire wheat, and from an excessive amount of sugary substances. For on this diet it is impossible for her to secure the sodium, potassium, iron, mag-

nesium, phosphorus, silica, sulphur, and chlorine which whole wheat and whole food products in general furnish.

The same is true of "pearled" barley, polished rice, white crackers and biscuits of every variety, oatmeal, and other foodless foods which have been robbed of most of their vital, life-giving elements, in the endeavour to make these substances look pretty and to cater to a vitiated appetite, created by usage and custom, for these degerminated and demineralized food products.

These are the opinions of many of the ablest medical men in the world. And before many years they will be universally accepted. When they are, the whole human race will be better off, physically and mentally, than it has ever been since those old days when our ancestors fought bloody battles with their teeth, and when to lose a tooth—especially a nice, serviceable canine tooth—was a hardship from which our grandfather of the Paleolithic age sometimes never recovered.

CHAPTER IV

WHAT MOTHERS SHOULD KNOW

MOTHERS, interested, as all mothers should be, in giving their children the best opportunity for life, liberty, and the pursuit of happiness, will demand to know, then, upon what food infants and children should be fed in order to secure the perfect balance in their ration that will enable them to obtain all the mineral salts needed for the proper development of their teeth and bones.

How Bodies are Built. Exactly as with adults, infants and children require proteids (or building stuff), fats and carbohydrates (which furnish heat and energy), and mineral salts and water.

In infants the proportions of these various elements must differ from the relative amounts required for mature persons, for infants cannot digest and assimilate certain kinds of food.

And, further than this, provision must be made not only for the natural waste of body tissues—

which is characteristic of most of the important cell structures—but also for the extraordinarily rapid growth which takes place during the first year of the child's life—a growth which causes almost a doubling in its weight.

Protein the Body's Brick and Mortar. While all foods might be considered to be of equal importance to the body, perhaps the most indispensable of all food forms is protein, which replaces the continuous waste of nitrogen in the cells of the body. This is furnished to infants by the casein and other albuminoids in milk.

It is this substance, in particular, which is toughened and rendered more indigestible when the milk is heated by pasteurization. And it is the irritating effects of these dense curds that constitutes one of the gravest dangers, not only to the health and life of the child, but to its ability to extract from the milk the mineral salts so necessary for the formation of tooth and bone structure.

Fats are also Important. Next in dietary importance are the fats, furnished by the cream, of which infants should receive on an average of seven per cent. to each feeding. The function of

the fat is to prevent the too rapid loss of nitrogen, and to add to the body weight.

Mineral Salts and their Action. The mineral salts—lime, magnesium, iron, etc., of which the milk contains liberal amounts—are next in importance, perhaps more so in infancy than in the later development of the child's life, for it is from these substances that the baby must get the material wherewith to build its teeth and bones—as well as to aid in forming the cells which make up its various organic structures.

Cow's Milk the Best Food for Calves. It may here be observed that while cow's milk contains three and one half times as much mineral salts as does mother's milk, it is generally conceded that the mineral salts in cow's milk are much better adapted for the nourishment of a calf than they are for building a baby. Which is an additional argument for breast-feeding the child, whenever an adequate, or even an inadequate, supply of mother's milk makes it possible to give the child this advantage.

More and more we are coming to understand the paramount importance of mineral salts—the profound influence they exert—not only on the

growth and development of the physical structure, but also on the development of the brain and nerves themselves.

Starving to Death on Food. In fact, it has been proved that mice, dogs, and other animals, when fed on a diet lacking in lime salts—as, for instance, degerminated corn meal, white bread, and distilled water—will get "nerves," just as human beings, deprived of lime salts, will get "nerves." And if this lime-free diet is persisted in, the dogs or mice will develop convulsions, and perhaps die.

Also, dogs which receive no lime in their diet will become subject to tetter and skin eruptions, their hair will roughen and fall out, and they will be quite likely to develop "mean dispositions."

It is even claimed that the lioness, fed upon meat alone, and given no bones from which to extract mineral salts, will bear cubs with cleft palates.

Be that as it may, the results of a mineral-free diet are sufficiently grave to warrant our most serious consideration.

Infants Need Water also. And lastly, the infant requires water. Water is essential in order to dissolve all the other food constituents, so that

they may be more freely acted upon by the weak digestive apparatus of the infant.

In proportion to its weight, the infant requires almost five or six times as much water as a mature person. Therefore, cool sterile water should be freely given to babies, from time to time.

Distilled Water "Bad Medicine." And never, under any circumstances, give distilled water. Sterile water—which is water that has been boiled to kill the germs, and then subsequently cooled—is all right, although the plain filtered water would be much better.

But distilled water is water which has been deprived of every particle of vital mineral matter. And water which is lacking in mineral matter will greedily abstract the mineral salts from any tissues with which it may be brought into contact.

Therefore, for the sake of your baby's health, and for the sake of giving it the best possible food opportunities to secure good tooth-building material, don't give it distilled water to drink, no matter how clear and beautiful this may look when it is in the bottle.

When the Mother Can't Nurse her Child. If the mother is unable to nurse her baby, it will be

necessary to work out a formula for milk modification which may be best adapted for the nourishment of the child. There can be no hard and fast rules for this, for children differ in their digestive capacities, as in their physiological likes and dislikes, just as do adults.

But the formula which has met with general favor, and which usually affords good results, is one made up of "top milk," milk sugar, milk of magnesia, and water.

A Splendid Formula. For an infant from three to ten days old (prior to this time the infant should be fed only with the colostrum which precedes the secretion of milk in the mother's breast) take six ounces of the top of a quart of milk. This can best be removed with a Chapin cream dipper.

Then take one and one half ounces of milk sugar (a level tablespoonful will hold about one third of an ounce of sugar of milk) and one quarter teaspoonful of milk of magnesia. This last is to overcome the abnormal acidity of the cow's milk, and also to overcome the constipating effect which cow's milk frequently produces, either with children or adults.

Then add enough filtered or boiled (not dis-

tilled) water to make up a twenty-four ounce mixture, which should be given in six or seven feedings.

From the tenth to the twenty-first day, these amounts should be increased, so that the baby is getting seven and one half ounces of top milk, two ounces of sugar of milk, one half teaspoonful of milk of magnesia, and enough water to make up a thirty-ounce mixture.

From the third to the sixth week the baby should get ten ounces of top milk, two ounces of milk sugar, three quarters of a teaspoonful of milk of magnesia, and water to make thirty-two ounces.

From the sixth to the ninth week, twelve ounces of top milk, two ounces of milk sugar, one teaspoonful of milk of magnesia, and enough water to make thirty-two ounces.

From the third to the fifth month, eighteen ounces of top milk, two ounces of milk sugar, one and one quarter teaspoonfuls of milk of magnesia, and sufficient water to make a forty ounce mixture.

From the fifth to the seventh month, twenty-one ounces of top milk, two ounces of milk sugar, one and one half teaspoonfuls of milk of magnesia, and water to make forty-two ounces.

From the seventh to the ninth month, twenty-seven ounces of top milk, two and one half ounces of milk sugar, one and three quarters teaspoonfuls of milk of magnesia, and water to make forty-eight ounces.

And from the ninth to the twelfth month, thirty-two ounces of top milk, two and one half ounces of milk sugar, two teaspoonfuls of milk of magnesia, and water to the total of a fifty-three ounce mixture.

Great Care must be Taken during Weaning. The diet during the months of weaning must be most carefully selected, with a view of adding to the milk and orange juice diet, not alone those foods which are readily digested and converted, but those foods which contain, as well, the essential nutritive salts, lacking which, the tooth structure and the bones cannot be properly nourished.

One of the finest of these "building foods" is whey—a milk product that has been but little used in America—a fact which partially explains the prevalence of dental decay and tooth loss among our children.

Why Whey is Good Food. Whey is an excellent

food by reason of the fact that it is extremely rich in lime and other mineral salts which help build tooth structure.

Whey also has the effect, common to all soured milks, of tending to overcome intestinal toxæmia—or auto-intoxication—which is a very serious condition, for the reason that it depletes the vitality, lowers the resistance, and makes it possible for the child to contract almost any variety of disease to which he may happen to be exposed.

It is because of this that whey, buttermilk, and clabbered milk—as well as Zoolak, Kumyss, and the fermented milks—have been of signal service in making for a better condition of health.

How to Prepare Whey. The best way to prepare whey is to heat a pint of fresh milk until it is lukewarm. Then add a teaspoonful of essence of pepsin or rennet. This is stirred for a few moments, and then allowed to stand, until it is firmly coagulated.

The curd is then broken up with a fork, and the whey strained off through thin muslin. The curd makes delicious "cottage cheese" for the members of the family who can digest this excellent article of food.

The whey, when administered to children,

should be diluted with water. And except when fed to those with very weak digestive organs, it should have a little cream added, to increase its nutrient properties.

A Milk Diet is sometimes Constipating. It may be well here to mention that infants and children, fed on an artificial milk diet, are very prone to develop constipation—which is one of the most health-wrecking conditions that can possibly afflict a human being.

For it favours the storing up in the system of the poisons of decay, which, if not promptly eliminated, tend to weaken the organic resistance, depress the system, and lower the vitality.

Fruit Juices Will Help the Bowel Action. The regular use of fruit juices may prove of splendid service in helping to overcome this obstinate condition. Of these fruit juices, perhaps the best is orange juice, from sound, ripe oranges. This should be strained carefully when fed to infants, to prevent the irritation consequent on the swallowing of fragments of orange pulp.

A teaspoonful of this freshly prepared orange juice three or four times a day is a most important addition to the diet of infants and young children.

Even breast-fed babies derive benefit from the administration of the fresh juice of the orange, at intervals.

Fruit Acid Helps Build Teeth. And, most important of all—from the dentist's standpoint—is the fact that the acid of the fruit is a distinct reenforcement to the alkaline-forming tooth and bone salts. For fruit acid is immediately decomposed in the child's stomach into the alkaline salts of calcium and potassium—both very essential elements of tooth structure.

This is a point that even well-informed physicians and dentists seem to have ignored. Yet it is one of the most important facts connected with the feeding of young children.

What the Kiddies Thrive on. There is a great variety of diet—nutritious and wholesome—that agrees excellently well with children of, say, three years and over.

But always the fact must be kept in mind that this is a critical period in the child's nutrition, and that, to a very large extent, his future development depends largely upon the way in which he is fed during these formative years.

Grape-fruit, oranges, ripe peaches, raspberries,

blackberries, strawberries, figs, grapes, muskmelons—apples in any form, but preferably baked or stewed—pineapple, baked banana, dates, prunes, and raisins, all furnish valuable salts and minerals that go to build up good health, as well as good tooth structure.

Then, all forms of whole wheat preparations—either bread, biscuits, or crackers, unscoured oatmeal, unpolished rice, unbleached barley, undegerminated corn meal, macaroni, or spaghetti, served with grated Parmesan, Roman, or whole-milk cheese—are nutritious and wholesome foods.

Dehydrated Vegetables an Excellent Source of Nourishment. Soups made of fresh or dehydrated vegetables—containing potatoes, onions, carrots, spinach, parsnips, and other vegetables—are particularly nutritious—for the reason that all their mineral salts are retained in the process of cooking, instead of being thrown away with the water in which they were boiled.

Parsley, lentils, peas, string beans, beets, and beet-greens, are also excellent, furnishing valuable growth substances and alkaline bases.

All these Vegetables May now be Secured in Dehydrated Form. It may be interesting here to

observe that, as a result of an exhaustive series of experiments, conducted by the United States Government, and carried to perfection by private enterprise, it will be possible shortly to secure all these vegetables in a form available for immediate use, eliminating entirely the drudgery and the waste of preparing them for the table.

Just as Good as Fresh Vegetables. These dehydrated vegetables contain every element and virtue that is to be found in fresh vegetables. They lack only the water of which originally they were largely made up. But, in every other respect—in colour, odour, flavour, and mineral salt and food content—they are identical with fresh vegetables.

This new food-source is destined to prove of inestimable value, not only in cheapening and making available for general use what is now available only for the affluent, but in providing a definite source of mineral salt supply for the teeth and bones of all those who still have teeth and bones worth saving.

Salads and Greens are almost Indispensable. Also, endives, celery, lettuce or romaine, or green salads of any kind, are almost indispensable for

the maintenance of good health. For they contain vitamines absolutely essential to normal functioning—as the epoch-marking experiments of Dr. E. V. McCollum, of Johns Hopkins, have conclusively proved.

We now know that the deprivation of certain substances found in green vegetable tops—as well as in butter fats—is the actual cause of many grave disorders of nutrition—such as pellagra, beriberi, and other diseases, which, not infrequently, end in death.

Meat is to be given rather sparingly; eggs, fresh fish, or milk with a fairly liberal hand.

Jam in Moderation is Wholesome. Fresh fruit jams or jellies, which are semi-natural sweets, are wholesome articles of diet, and satisfy the "sugar craving" which seems almost a universal trait in children.

These, with such additions as common sense may suggest, will be found to constitute a splendid all 'round diet upon which children may thrive and keep perfect health.

The potassium and calcium salts, particularly necessary for the teeth and bones, will be found in the fruit. While phosphorous, iron, chlorine,

sodium, sulphur, magnesium, and silica—all of which contribute to the nutrition or function of certain definite structures—will be found in the natural grains, with whole wheat, bread, and milk.

Butter is a very essential article of diet—furnishing vitamines necessary to growth; but unless it is perfectly fresh, the child is better off without it. For rancid butter contains substances decidedly irritating to the delicate stomachs of children.

Food the Very Essence of Tooth Conservation. I have been thus explicit on the important subject of the diet because I realize, more and more clearly every year, that in the selection of the diet, and in the proper observance of structural tooth-needs, lies the very essence of tooth conservation.

All the marvellous achievements in dental technique, and all the advances made in the prophylactic art, are merely palliative. They are the feeble attempts to restore to as nearly natural as possible a condition which should never have been permitted to develop.

So if you would help your children to the inestimable boon of strong, sound teeth, feed their teeth with food that supplies the only substances out of which teeth can be built.

CHAPTER V

HELPING BABY WITH HIS TEETH

THERE are not many people who know that a baby really commences to develop his teeth about thirty weeks before he is born! Yet it's a fact that at about the sixth week after conception, a tissue forms on what subsequently develops into the jaws of the embryo. This is called the "dental band."

The "Dental Band" and its Function. It is from this dental band that the cells and sacs and tissues which subsequently become bone and pulp and enamel—and all the other elements of the tooth-structure—are formed.

The method of development of these tooth-structures is a fascinating study. But it involves a technical description that is entirely too complicated for the scope of this work.

What Little Teeth are Made of. Sufficient for our present purpose is it to point out that the structure of the teeth consists in enamel, the

dense outer covering of the teeth; the dentine, which is the bonelike substance that gives the tooth its form; the pulp, which carries on the nutrition of the teeth and of the highly sensitive nerves which run into it; the cementum, which is a modified bone distributed over the dentine at the root, and which meets the enamel edge to edge, lapping it or being overlapped by it.

The Cementum is a very Important Part of the Tooth. The functions of the cementum are to afford means of strongly attaching the teeth to the jaw-bones, by the aid of the "pericemental fibres." Also, in case the pulp dies, the pericemental membrane is capable of maintaining the vital relations between itself and the alveolar process in which the tooth is imbedded, thus preserving the usefulness of the tooth, even though the tooth may be "dead."

How the Pericementum Helps. Then the pericementum—which is a sort of sheath—forms a lining to the cavity in the jaw-bone into which the tooth is fitted, and furnishes, by its membranous bands or attachments, the means by which the teeth are retained in their sockets, and a certain degree of motion permitted.

Helping Baby with His Teeth

Baby's First Tooth. In the normally nourished child of parents unafflicted with any constitutional or transmissible disease, the eruption of the first tooth takes place at about the seventh month after birth, and all the deciduous, or milk teeth, should be erupted somewhere about the twenty-fifth month of the child's age.

Some children, however, may be born with teeth erupted. In others, the process will not even have been begun before the twelfth month—or even later.

The first teeth to make their appearance are the two incisors, or cutting teeth, usually those on the lower jaw; followed a couple of months later by the two on the upper jaw.

Then the lower and the upper lateral incisors appear—at about the twelfth month; followed by the first molars at fourteen months. Then the cuspids at eighteen months, and the second molars at twenty-six months.

How Long the Trouble Lasts. The duration of the eruption of the incisors varies from one to ten days, the upper central and lateral incisors, from four to six weeks, the first molars from one to two months, the cuspids from two to three

months, and the second molars from three to five months.

The time elapsing between the appearance of the various groups is no doubt a wise provision of Nature which permits the organism of the baby to recover from the effects of previous disturbance before it is afflicted with fresh sources of irritation.

What Every Mother Knows. As every mother knows, the processes of dentition are accompanied by more or less disturbances of the digestive tract. Even reflex conditions, such as fever, stupor, convulsions, or meningitis, may manifest themselves.

Slight stomach and intestinal disturbances—such as vomiting and diarrhœa—are so common at the period of eruption that they are looked upon as quite natural at this time. The resorption of the soft tissue over the point of the teeth, sets up a mild, nonseptic inflammation at that point.

The gums are very tender, and there is some evidence of local inflammation, which is temporarily relieved by letting the child bite upon the fingers of the nurse, or upon rings or other objects.

A Little Biting Exercise is Good for the Teeth. A little of this exercise may be helpful, in facilitat-

ing the "cutting" of the teeth; although an excessive indulgence in this practice, as I have pointed out in another chapter, may produce a distortion in the shape of the jaws, the results of which are far-reaching and permanently deleterious to health.

How Ice Helps a Baby's Teeth. Perhaps one of the least objectionable and most helpful of all measures at this time is to permit the child to bite upon a piece of ice, which, in addition to mechanically diminishing the blood supply—and consequently the congestion of the parts—also causes constriction of the dilated blood vessels.

The local disturbances, accepted as physiological and natural, may be exaggerated to give rise to nervous, digestive, or pulmonary troubles, as well as to skin disturbances.

Even epilepsy may have its exciting cause in dentition which has become pathological—especially where a neurotic taint may have been inherited.

How to Tell when a Tooth is Coming through. Mothers will recognize the local symptoms from the fact that the red and swollen gum tissue immediately over the tooth takes on a dusky

colour. Or the jaws may be white and glistening—as a result of the tense stretching of the tissues over the crowns. Occasionally the gums over the erupting tooth may be swollen with a fluid.

The child will manifest local irritability from the fact that he will resist any attempt to touch the gums, or if he seizes the breast or the bottle-nipple he will immediately release it again.

The readiness with which the child will bite on ice, or on other cold substances is a certain sign of local tooth disturbances.

Ulcerated Gums Dangerous to Health. Occasionally, the gum tissues may become ulcerated from the presence of bacteria, producing an "ulcerative stomatitis"—characterized by patches of infection. These bacteria, swallowed constantly, as they are, produce intestinal fermentation, with diarrhœa and colic.

Almost always there is loss of appetite, fretfulness, anger, restlessness, sleeplessness, thirst, and mild fever—and the child constantly tries to sit up.

How to Treat Ulceration. In all ulcerative conditions the child's mouth should be thoroughly washed with a saturated solution of boric acid. This can be applied by means of a cotton-tipped

probe, or on a soft cloth wrapped around the fingers of the mother.

Sometimes a spraying with a three per cent. solution of hydrogen dioxide, followed by another spray of chloride of potash—of a strength of twenty grains to one ounce of sterile water—gives quick relief.

The Pain of Erupting Teeth. The pain of erupting teeth comes on in paroxysms, but it may be continuous. Twitching of the muscles is common—especially of the muscles of the eyes and lips—the thumbs are drawn towards the palms of the hands, the feet drawn upward.

The Irritation Must be Relieved. Unless the source of irritation be removed, the child may develop spasms, and in very severe cases it may even become paralyzed or die. The skin eruptions, which are quite common, usually occur about the mouth, although they may also be observed upon the skin of the body or limbs.

The pulmonary irritation expresses itself in a persistent laryngeal cough, which disappears as soon as the teeth are erupted.

Keep Everything Sterile. Mothers should see to it that the nipples and bottles of a nursing

child are absolutely sterile—and, in fact, that nothing is put into the mouth of a child unless it has been scrupulously cleansed, or is free from sources of contamination.

How to Overcome the Diarrhœa and the Colic. If the diarrhœa and the colic are very persistent, a good cleansing dose of castor oil should be administered; while listerine, in ten-drop doses in water, every three hours, will serve as an excellent intestinal antiseptic.

Don't Hesitate to Lance the Baby's Gums. To reduce the local inflammation a dentist or a physician should be called in without delay, and the gums should be properly and thoroughly lanced, so that the binding of the tissues may be removed, and the teeth permitted to erupt normally.

This will usually give immediate relief, and should not be deferred. For it is inhuman and irrational to permit a child to suffer, when a little bit of cutting will so effectually relieve it of its trouble.

Many object to lancing the gums, urging that if the tooth does not erupt immediately, scar tissue is formed, which will bind the tooth down more firmly than before.

This is not true. For scar tissue, being much more loosely organized than normal tissue, is more readily broken down by the pressure of the erupting tooth.

So, do not listen to objectors if your baby is having trouble in cutting his teeth. Just go ahead and help him cut them, by removing the obstacles that stand in the way of the teeth coming through.

The Meaning of Rickets. Children afflicted with rickets (or rachitis) have the process of eruption greatly delayed, and are quite liable to these pathological dental states. In rickets there are typical deformities in the bones, with tardy development and faulty structure of the teeth.

While the true causes of rickets are not definitely known, these conditions are frequently due to a lack of lime salts, which should be supplied by the food, and the lack of which causes an absorption of the lime contained in the bones and tooth structures.

Professor McCollum says: "Rickets is a disease of the first two years of life, and is especially prevalent in children whose milk diet is replaced too largely by cereals and other vegetable food not

suited to the delicate digestive tract of the young child."

Dr. Hatfield calls attention to the fact that "The nutritional disturbances often leave the child delicate and emaciated—the muscles soft and flabby. One of the earliest diagnostic signs is the 'rosary,' the row of nodules which form at the junction of the ribs with the cartilages, and though not always seen, can usually be felt when present."

Rickets is often Preventable. If the mother nurses her baby upon a supply of milk deficient in these mineral salts, or milk poor in fat—or if she feeds it on proprietary foods, lacking in these essential elements, or if the child gets too much starchy or sugary food in its diet, or is fed exclusively upon condensed milk, rickets is peculiarly likely to develop.

The Treatment for Rickets. Every child who suffers from rickets should get fresh fruit juices in plenty, so that it may have the advantage of their alkaline salts of potassium and calcium, and of the alkaline carbonates into which the feeble acids of the fruit are oxydized.

The child should also have a good quality of milk, and, if old enough, white of egg, beef broth,

and substantially the same variety of base-forming foods that are found so effective in scurvy.

And Have a Good Physician "Look them Over." Also, the child may need iron, manganese, potassium, or some alterative treatment for a strumus condition complicating its rickets, so it would be well always to have the advice of a competent physician in these cases.

What Scurvy Is. Scurvy (or scorbutus, as medical men call it) is another condition that is very likely to complicate dentition, although not so likely as is rickets. For scurvy is more generally acquired by improper diet—while rickets is frequently due to mal-functioning of an inherited character, as well as to errors in diet.

Scurvy is more generally found in older children who have been improperly fed. Yet it may be an important factor even in children of a tooth-erupting age.

How Scurvy May be Recognized. In scurvy, there is a feeling of depression, together with a lack of energy. This may be associated with anæmia and shortness of breath, together with a congestive condition, and a tendency toward a swelling of the gums.

Scurvy has been traced distinctly to the deprivation of certain essential food elements, found in the life-giving vitamines, mineral salts, and acids.

Sometimes it is complicated by chronic intestinal conditions—especially intestinal indigestion and auto-intoxication.

Breast-fed Babies rarely Get Scurvy. Babies who are nursed by their mothers do not get scurvy very often—although at times even these babies may show some symptom of it, if they are continually deprived of orange juice.

Mostly, however, the condition is brought about in them by the use of proprietary baby foods—deficient in essential nutrient elements—and a lack of fresh vitamine-containing food.

This disorder manifests itself, usually, at from the eighth to the twelfth month—rarely before the sixth, and seldom after the sixteenth month—in those children in whom the circulation is enfeebled and the blood impoverished.

How to Know it is Scurvy. Mothers can easily recognize the condition by the fact of the gums being red and swollen, protruding over and up between the teeth (if there are any teeth present to protrude over). The baby's breath is very

offensive, owing to putrefaction in the blood supplied to the gum tissues.

There is a good deal of stomach irritation, constant thirst, and a craving for acid foods. Sometimes the joints are painful and swollen, owing to local hemorrhagic conditions. The urine is dark coloured, and inclined to be scanty in amount.

How to Prevent and Cure Scurvy. The prevention and cure of this condition is ridiculously easy. It merely requires that plenty of lime juice or fresh lemon, or orange juice, be given, together with the juice of fresh vegetables.

In addition, fresh milk, white of egg, and beef juice are valuable; while in infants, breast-feeding is to be substituted for the use of proprietary foods.

It will also help materially if the mouth is sprayed with a sedative antiseptic, such as chlorate of potassium, twenty grains to one ounce of water.

This Isn't all that Can Ail them. There are many other things that can happen to a youngster who is just coming into toothhood. But these are the principal things, and the most generally met with.

And if every mother in the world would only

remember these matters—so simple, and, in many instances, so obvious, thousands of little lives might be saved every year, and millions of days of useless misery and suffering might be prevented.

This, to my mind, is an educational measure, second to nothing else in the world in importance. The knowledge should be taught to girls from their very earliest school years.

And then we would have a race of mothers who would actually *know* something about how to take care of a baby after they had one. Which precious few of them now do—more's the pity.

CHAPTER VI

THE TEETH OF CHILDREN

FEW mothers understand the importance of preserving the child's first teeth. They have been led to believe that these teeth are only temporary anyhow, and must eventually be replaced by the second, or permanent teeth.

Consequently, they neglect to have the cavities that appear in these teeth attended to in time to save them, and the teeth are lost long before the time they should normally be replaced by the second, or permanent teeth.

Now, nothing could be more definitely and lastingly harmful to the child than to lose its first teeth before the second teeth are ready to displace them.

When the Teeth Appear. Normally, this displacement should take place with the central incisors at about the sixth or seventh year; the laterals, from the seventh to the eighth year; the

first molar, excluding the sixth-year molar, ninth to tenth year; the canines, eight to ten years for the lower, eleven to twelve for the upper; and the second molars from the twelfth to the thirteenth year.

Teeth Serve a much more Important Function than merely to Make us Look Pretty. It must be remembered that it is not alone for their "looks" that the preservation of the first teeth is important. For much more important yet is the fact that second teeth will "come in" irregularly, if the restraining and regulating influence of their neighbours is lost, through the extraction of these members. And irregularity, once started, always tends to become progressively worse.

What Poor Mastication Does. This results in poor mastication of the food, with lowered power of digestion and assimilation, and increased waste of absorption.

Consequently, the distributing systems do not convey sufficient material to the bony and muscular structures to meet the normal demand for growth substance.

There is a general deficiency in the development and "tone" of the entire body. The bones and

muscles of the jaws suffer also from this general malnutrition, and the teeth become even more irregular and lacking in their essential salts, as a consequence.

The bones that support the teeth do not grow large enough to support them properly, or to accommodate all the teeth in the normal position in which they should be accommodated.

In some cases the jaw-bones are so small that many of the teeth cannot find a place to come through at all, and they remain impacted in the bones of the jaw—giving rise in later life to chronic neuralgia, headaches, and many grave nervous and physical disorders.

And, as I have pointed out in the chapter on Orthodontia, the normal physiological relations between the mouth and the nose are also affected —causing a profound disturbance in the function of the breathing apparatus—which results in the narrowing of the air passages.

How Mouth-breathing Begins. This causes mouth-breathing. The air enters the lungs improperly warmed, unfiltered, and unmoistened. The blood is insufficiently supplied with oxygen. Shoulders become rounded, chest flat, and faulty

positions in standing or sitting are acquired, which result finally in developing spinal curvature.

Hard to Keep Crooked Teeth Clean. Also, irregular teeth are kept clean only with great difficulty, and the problem of repairing or replacing them later becomes much more complex for the dentist.

Further, the normal occlusion of the teeth is interfered with, causing them to "rock" in their sockets, and become loosened.

The Chief Cause of Pyorrhœa. This is one reason why pyorrhœa, or Riggs's disease, is so often found in mouths with irregular teeth. The gravity of this pyorrhœal condition is manifested in later life by the development of headaches, rheumatism, diseases of the heart and blood vessels, of the kidneys, and even of the eyes.

Mothers must be made to understand that St. Vitus' dance, epilepsy, and even insanity in children frequently have their origin in the nervous and systemic conditions produced by irregular teeth, and by the early loss of teeth that should have had careful attention by the skilled dentist.

The Cause of Impacted Teeth. Even when a tooth cannot properly erupt, however, it never-

theless persists in developing, causing a direct pressure on the nerves. This produces a reflex action on the nervous system, which may even cause "tic"—known more generally as "tic doloreux." This is characterized by a twitching of the facial muscles on the side affected, associated with the most agonizing pain—with the possible exception of angina pectoris—known to human beings.

Or it may only result in producing nerve shocks, that find their expression in various reflex actions, such as twitching of the muscles and limbs, or even in such grave nervous disorders as melancholia.

Seventy-five per cent. of All Americans Have Irregular Teeth. In America today it is estimated that fully 75% of people have irregular teeth. At the Forsythe Dental Infirmary it has been shown that fully 95% of the children presenting themselves for treatment are thus affected.

The difficulties which the cleansing of such teeth entails obviously results in dental caries—decay of teeth.

Living in the Limestone State Doesn't Help them. Dr. James R. Mitchell, lecturer in Chemistry at Fort Worth University Medical College,

has stated that 86% of school children in the City of Louisville have dental caries and septic tooth conditions—notwithstanding the fact that they live in the Limestone State!

It's the Defective Diet and the Lack of Tooth-care. In an examination of 10,500 school children, the British Dental Association found 86% suffering from more or less pronounced defects of the teeth—the result of a diet lacking in the essential mineral elements upon which the bones and the teeth depend for their development; and of the early loss of teeth that should, if they had proper care, have been retained until they could be replaced by the eruption of the permanent teeth.

Out of 1694 children examined by Dr. A. Freedman Foote, only 11 were found to possess normal teeth. Dr. Foote, in a report to the Second District Dental Society of New York, stated that: "The sixth-year molars of nearly every child examined were broken down wholly or in part. In many instances the molars were decayed below the gum margins. So extensive and far-advanced were the defects, that corrective treatment, even if it were applied, would have been of little corrective value."

The Teeth of Children

The New York Department of Health, through Dr. T. Van Wincle, examined the teeth of 231,081 school children in New York City, finding 131,747 defective.

In the clinics of Northampton, Mass., established by Mr. William Cordes, the General Manager of the Florence Manufacturing Co., and Principal Janes, the Superintendent of Schools—it was found that of 2400 children examined, 97% were in need of dental attention.

Never yet Has Seen a Perfect Set of Sixth-year Molars. After examining the teeth of many thousands of school children, I myself have yet to see a perfect set of sixth-year molars. These teeth, in nearly every instance, were entirely decayed. Indeed, I may say that I have never seen a perfect set of teeth in any American child.

Most Children Have Normal-shaped Jaws and Faces—until they Lose their Teeth. Specialists in dentistry state that they find that by far the greater number of children who have reached the age of two and one half to three years (when the temporary teeth have all come in) have a normal development of the face and jaws.

Doesn't this go to prove that if these children

subsequently develop malformed jaws—and all the train of evils that must accompany the possession of such jaws in later life—that the fault is ours, for neglecting to keep these jaws normal?

I have spoken, in another chapter, of the evils of the "pacifier," of thumb-sucking, and of other mechanical causes for malformed jaws, and irregular teeth, which evils cannot be too strongly condemned.

It's Neglect—Pure and Simple. So, neglect of the temporary teeth is the most frequent cause of irregular teeth. No child, without a full complement of the first teeth, kept intact throughout their natural period, can hope to have permanently regular teeth.

Therefore, it is of far greater importance for the general health of the child to care for and preserve its teeth up to the fifteenth year of its age, than it is to exercise the utmost vigilance all the years of its life afterward.

Teach the Child to Chew on Both Sides of its Mouth. It is also very essential to encourage the child to chew on either side of its mouth. Many children get into the habit of favouring one or the other side while masticating food—a practice

that may have its origin in some attack of tooth-ache or of tooth-tenderness on the side that is being favoured.

This one-sided chewing tends also to develop the muscles of the jaws asymmetrically—affecting the even contour of the face.

This may not be very important with most of us—who are no prize beauties, anyhow. But there is no use in being any homelier than God made us—if it is at all avoidable.

One-sided Chewing Tends also to Develop Tartar. Also this one-sided chewing tends to favour the deposit of tartar on the surfaces of the teeth which are deprived of their rightful share in the exercise of mastication. For remember that the mechanical effects of mastication act in identically the same way in cleansing and scouring the two surfaces as would the mechanical effects of the bristles of a toothbrush, or a corrugated rubber finger cot, or anything else which is designed to cleanse the teeth by friction.

The result of these accumulations of tartar is to bring about—by the irritation of their presence at or below the gum margins—an inflammation of the gingival tissues, which is one of the most

frequent of all forerunners of pyorrhœa, as well as ultimately to cause an exposure of the necks of the teeth by producing a resorption of the gum tissues irritated by the tartar.

How to Relieve Toothache. In the toothache of children—or of adults, for that matter—it may be advisable to apply some simple home treatment for relief, until such time as the services of the dentist may be sought.

In the toothache caused by an inflamed or a dying pulp—which is the most frequent of all causes for toothache—considerable relief may often be obtained by placing a pledget of cotton, saturated with oil of cloves, or campho-phenique, into the cavity.

Fletcher's carbolized resin, applied on a pellet of cotton, often acts as an efficient anodyne, or pain-reliever. In addition, the resin hardens in the cotton, forming thereby a temporary stopping, which may last for several days—even enduring the force of mastication.

Turn Decaying Tooth-pulps into Painless Soap. Prof. L. L. Dunbar, a very great authority on dental matters, says: "As a domestic palliative, always at hand, in the treatment of pulp exposure

and restricting odontalgia (toothache confined to one tooth), use ammonia on cotton; its repeated use will devitalize the pulp, at the same time effecting its removal by saponification."

This means that the alkali of the ammonia, coming in contact with the fatty acids that largely form the pulp of the teeth, change these into soap —by the well-known action of alkalies on fats. This is a point that every mother will do well to remember.

But Don't Rely on Make-shifts. See Your Dentist. These measures, however, are only palliative, not curative, and the dentist's aid should be sought at the earliest opportunity, in an attempt to fill or otherwise save these aching teeth.

Zone Therapy has been Very Helpful. Various applications of Zone Therapy have been extensively used for the past four or five years by well-informed dentists and laymen in every part of the country. While these measures are not always successful (nothing is that deals with the human organism), not infrequently the results are surprisingly gratifying.

This practice merely requires the placing of tight rubber bands or "therapy zones" (spiral

wire rings) over or between the joints of the fingers corresponding to the zone of the involved teeth—or else in pressures made in various parts of the head and mouth.

In the chapter dealing with Zone Therapy, I have gone rather extensively into this subject, and I believe that, for actual help, this will be found to be one of the most valuable chapters in the book.

Sensitive Dentine Can be Readily Relieved. If there should be a sensitive condition of the teeth—particularly about their necks—together with a tendency toward erosion of the enamel or dentine, it will usually be found that the mouth secretions are excessively acid.

This condition may also be aggravated by over-indulgence in grapes, grape-fruit and other acid fruits—or by using lemon juice or vinegar too freely. This has the well-known effect of "setting the teeth on edge."

The acid condition can best be overcome by keeping the teeth scrupulously clean, and by rinsing the mouth several times a day, and especially at night just before retiring, with a teaspoonful of milk of magnesia.

This neutralizes the acid, and deposits a protective film of alkaline magnesia over the surfaces of the teeth, and over the exposed necks of the teeth—preserving them from further erosion.

The Watchword is "Prophylaxis." Needless to say, the moral of all this preachment is prophylaxis—the prevention of tooth-decay. From their very earliest appearance the nurse or the mother should begin to clean the child's teeth with a cloth wrapped around the finger—and wet in a saturated solution of boric acid, or in some good alkaline or antiseptic mouth wash.

The Toothbrush Age. As soon as the child is old enough—three years, or even younger, is about the proper age—it should be taught the use of a little brush, and encouraged to use this after each meal, if possible, and particularly before going to bed.

How to Use Dental Floss. A spool of floss silk should also be provided, a strand of which the child should be taught to draw between the teeth, so as thoroughly to remove from the inter-dental spaces any impacted particles of food which, if allowed to remain, would ferment and cause tooth-decay.

Floss silk is much better than a toothpick, as it is not so likely to injure the delicate gum structures, and to cause bleeding and possibly recession of the gums.

If particles of meat or other foodstuffs are lodged so tightly between the teeth that the plain waxed silk will not dislodge them, teach the children to tie a knot in the thread, and then to draw this through. This little "stunt" is particularly effective.

Great care should always be taken to avoid injuring the gums, or to cause them to bleed, as this tends to recession of the gum structures, and provides an opening through which germs may find entrance into the vulnerable tissues—thus favouring the development of pyorrhœa and inflamed conditions of the gum margins.

Most Important to Clean the Teeth at Night. Be especially careful to see that the child performs its mouth toilet before retiring at night—no matter how sleepy or indisposed to exert himself he may be.

For the night is the "period of greatest decay." The busy little tongue and the jaws are at rest, and the salivary secretions are not kept circulat-

ing as they are in the daytime. This permits of the development of hyperacidity in the salivary secretions, and the attack of these acids upon the vulnerable alkaline substance of the teeth.

The Few Exceptions to the General Rule. There are occasional instances in which the teeth do not erupt when they should. Indeed, there are a few cases on record in which the individuals never erupted *any* teeth—neither temporary or permanent. They chewed with their gums all their life long.

And occasionally, the deciduous, or first teeth, may be retained for an abnormal length of time—even to the sixteenth, eighteenth, or the twentieth year.

No Definite Proof of a Third Set of Teeth. But these are cases almost as rare as would be the cutting of a third set of teeth by an old man or woman, who hadn't had a tooth in their heads for twenty years. This third set of teeth, I may say in passing, is quite as fanciful as any of Munchausen's stories, or any Arabian Night tale. It usually resolves itself, upon investigation, into a case of tardy eruption of some impacted teeth, or of the eruption of a few supernumerary teeth.

There are no authentic cases in medical or dental record where an actual third set of teeth has ever been seen by competent observers.

Gritting the Teeth may be a Symptom of Serious Disorder. If a child grits and grinds his teeth constantly during sleep, it might be well to seek the advice of a medical man. For frequently these conditions are manifestations of some reflex disturbance, caused by intestinal or stomach worms; by chorea or epileptiform symptoms; or even by some central nervous disturbance, in which the brain may be subsequently involved.

If the gritting is merely a habit, it is distinctly a bad habit, and should be broken up by the wearing of a rubber plate protecting the teeth during sleep; or else by a course of therapeutic suggestion—which is remarkably efficacious in these neurotic conditions.

So, active tooth-care commences properly with early childhood, and should last as long as there are any teeth left to care for. The time devoted to it is profitably spent time—as much so as any similar amount of time the individual ever spends on himself during his entire life.

CHAPTER VII

HOW SUGAR SUCKS THE LIME OUT OF TEETH

It is believed by most dentists—and this is an opinion generally held among the laity, as well, that the sugar we use, in the form of candies, acts directly in the destruction of the teeth.

This opinion is so ingrained in the consciousness of most people that to dissent from it amounts almost to a heresy, and stamps the one contradicting or qualifying the accepted opinion as being distinctly heterodox in these matters.

Yet right here I want to go on record as being heterodox respecting this important subject—not to the fact itself, but as to the way in which the fact is brought about.

Acid Fermentation only One Cause for Tooth Decay. While it is true that the development of lactic acid from the fermentation of the sugars eats away the alkaline substance in the enamel of the teeth, and favours the development of micro-

organisms, this is only one of the ways in which sugar acts.

For the chief damages done by sugar and candy eating in excess is to cause mineral-salt starvation in the system, and the softening of tooth and bone structure, which is a natural consequence of this drain. This is a most important point, and one that every mother, and every human being interested in teeth, should remember.

The reason is as plain as a pikestaff when it is recalled that the vital processes of the body cannot be carried on except in the presence of lime. Therefore it is that if there is a deficiency of lime salts in the food, the body actually must tear down its own mineral structure in order to obtain this necessary material.

How the Teeth are Drained of Lime Salts. So, by that wonderful process called "selective affinity," lime is extracted bodily from the only available source of supply in the system—the soluble lime of the teeth and bones. This is gradually drawn upon and consumed—weakening the resistance of the tooth structure—until finally the enamel cracks and breaks down under the strain of mastication, or from the accidental biting upon

small pieces of bone, crusts of bread or any extra hard substance, and thereby a minute opening into the vulnerable interior of the tooth is affected.

This permits the entrance of a corps of micro-organisms—who are waiting for just such a chance—and the process of destruction is then in full swing.

The real damage, however, was begun long before there was any external evidence of its extent, and was first brought about by the weakening of the tooth structure itself, by reason of the systematic abstraction of its lime salts—afterwards hastened by the destructive action of the bacteria of decay.

Sugar in itself Does not Destroy Tooth Enamel. Yet sugar and fruit acids, in themselves—and apart from their products of fermentation—have no ill effect upon tooth enamel. In fact, sound teeth can be immersed in a solution of such sugars and acids for months, and suffer no eroding influence. So sugar itself has no direct action upon the teeth, and is not, in itself, a cause of bone and lime-salt destruction.

Very few people, even professional men, seem to be aware of this fact, a fact which has a most

important bearing upon everyday principles of nutrition.

Yet, here again, the most important reason for tooth-decay from sugar eating is apparent. For sugar and lime have just as remarkable an affinity for each other as have iron and oxygen, which combine to form rust. So that when we take into the system an excessive amount of mineral-hungry candies, the sugar eats up the soluble lime of the blood, and the blood, robbed of its store of vital lime salts, seizes upon the mineral salts stored up in the teeth and in the bones, to replenish its supply.

Why we Need Lime. But lime is absolutely indispensable for the substance of the teeth, for the strength of the bones, for the firm texture of the muscles, for the coagulating power of the blood, for the digestion of our food, for the stimulating effect upon the pulsation of our hearts, and for the proper functioning of the kidneys—in fact for the general health of the body. Indeed, it is quite impossible to over-estimate its importance in the animal economy.

Make Your Grocer Get Brown Sugar for you. So right here it may be pertinent to observe that

neither infants, children nor adults should eat refined sugar, if it is at all possible to secure the genuine brown sugar, with its original richness of aromatic and nutritive substances, combined with its iron, calcium, magnesium, silica, phosphorous, and other mineral salts, all of which help build strong teeth, sound nerves, and rugged bodies.

Raw brown sugar, and molasses which has not been bleached and be-devilled with sulphuric or sulphurous acid, are valuable food forms—not only for children, but for every human being.

Mothers, everywhere, should demand these products, and insist that their grocers supply them—just as they should demand whole-wheat bread, brown unpolished rice, unpearled barley, unscoured oats, and undegerminated corn products. For remember that on the same principle that implies the extreme difficulty of making bricks without clay, or cement without sand, one cannot make teeth without lime, nor bones without mineral salts.

It's merely a business proposition, conforming with natural law. Quite as simple as arithmetic, and as fundamental. And, by the same token, just as little understood, in any broad, compre-

hensive way. Which is one of the chief reasons why our fellow-countrymen have the very worst teeth in the world—and, unless they radically mend their dietetic ways, the smallest hopes of any appreciable improvement.

CHAPTER VIII

CROOKED TEETH AND TWISTED BRAINS

JUST because a youngster has a protruding upper jaw, with unduly prominent teeth, and a retreating chin; or because she has an exaggerated lower jaw, constantly parted lips, or a chronically open mouth, is no reason she should be permitted to remain thus.

Because we have allowed the development of an abnormal type of face doesn't signify that we shouldn't repent of our carelessness, and remodel these unsymmetrical features a little nearer to the heart's desire.

Of course, we are not entirely to blame for neglecting this matter, for, until recently, only a few of us knew what caused the conditions we thought natural and unavoidable, and still fewer knew how to correct the trouble when they did find out.

But now the children, and young folks up to

the age of twenty-five, victims of unsymmetrical features, or martyrs to actual facial deformity, can be made whole, wholesome, and even-featured, as Nature originally intended them to be.

Training Teeth in the Way they Should Go. The protruding upper lip, completely overhanging the characterless chin and the retruding lower jaw; the lack-lustre eye and lackadaisical expression, are all readily amenable to correction. Mouth-breathing—with the adenoids, enlarged tonsils, and contracted nasal passages that are associated with it—can quite frequently be corrected.

Grave physical disorders, due to a disturbance in the function of the ductless glands of the head and throat, can be remarkably improved. All these things, and many that are even more impossible-seeming, are being corrected every day by carefully moving the teeth from where they are to where they belong.

This is accomplished by *orthodontia*—perhaps the most modern and exact of all the various branches of the healing art. Orthodontia is defined by Dr. Edward H. Angle, the man who has done most to develop and perfect it—as

"that science which has for its object the correction of malocclusion of the teeth." (Malocclusion means bad or faulty contact.)

As the Tooth is Bent, So is the Child Inclined. "To make teeth grow right"—this is the orthodontic slogan. And it is most important to everybody concerned that teeth should "grow right." For if they do, we'll grow right; and if they don't, we may not.

People with "lantern jaws" and no cheekbones worth mentioning owe their condition to malocclusion. Their teeth fail to meet, because their upper jaws do not develop, and their lower jaws are exaggerated by misdirected muscle pull—which ultimately causes the front teeth either to point out or to toe in.

When a tooth is out of place in relation with the planes of the skull, and fails properly to occlude—or come into normal contact with—the two on the other jaw, or when it is in incorrect relation to its neighbours, one chief cause is that the bones of the face or the jaws are undeveloped.

Normally, the external curve of the lower jaw should be slightly smaller than the curve of the upper. Therefore, the outside of the lower teeth

should fit inside the upper teeth; and each tooth, with the exception of the third upper molar, should fit into two teeth on the opposite jaw.

Give the Teeth Standing Room. Every tooth must have room in which to stand, and its cutting or grinding surfaces should be in proper position for the "bite." If it isn't, however, we have a remedy in orthodontia, which stimulates the growth of bone by tooth movement.

Dr. Albin Oppenheim, of Vienna, employing spring arches and wire ligatures, such as orthodontists use, proved that under this mild force Nature will dissolve bone salts from one side of a moving tooth, and without waste—as effectively as a man can dig one hole and use the material thus dug out to fill another hole with—redeposit the bone substance on the other side of the self-same tooth.

In addition to stimulating normal secretion of the glands—which, in themselves, have a most vital influence in the development of mental and physical capacity—we must also recognize the increased nutrition the brain receives, owing to the removal of pressure from the lymph and blood vessels.

Backward Children Brought forward through Tooth Straightening. This is especially marked in the case of backward children, who, according to the Binet-Simon tests for determining mental age, are years younger in mind than in body. Following the straightening of their teeth, and the spreading of their dental arches by orthodontic means, however, the advance in their school work, in their reasoning powers, and in their mental quickness and acuteness, has been most gratifying. This is not alone apparent in isolated cases, but has been a routine experience in thousands of instances, and in every part of the country where are found men capable of doing this important and interesting work.

Indeed, it is a routine result in orthodontia to take a child who is unable to sleep, eat, study, or play normally; who is subject to fits of depression or high temper, or who becomes fatigued on the slightest exertion—or for no exertion at all—and in a few month's treatment, bring about a complete change in the child's physical and mental condition.

It has been found that young patients "who have never known a well day"—who have run

the gamut of every disease in the children's calendar, have been treated for almost everything a child could be treated for—except the things that ailed them—their teeth.

Yet, when the teeth were moved into their proper places by orthodontia, all symptoms cleared up, and many of these youngsters have been bright, animated, and entirely free from illness ever since. The cosmetic effects of their dental correction are too obvious to warrant more than a mere reference.

Even Insane Patients Helped. Some of the most gratifying results of orthodontic treatment are seen in its influence upon mentality. When the bones of the face and the head are undeveloped, and the nose is stuffed with adenoids and polypi (little grape-like bunches of abnormal tissue), the child becomes stupid, inattentive, forgetful, and lacks the power of concentration—because these growths obstruct the lymphatic circulation of the brain, and prevent it from receiving the supply of nutrition necessary for its proper development.

Curing the Impulse toward Suicide. Tardy appearance of the teeth, or "impaction," has been known to cause melancholia, mania, and other

forms of insanity. In 1876 Savage, the English alienist, reported a case of mania following acute illness. This patient, after three months in the asylum, developed a very severe toothache. The tooth was extracted, and a considerable quantity of pus found at the root. In an incredibly short time the maniac was lucid, and remained so. Another patient recovered after the evacuation of two abscessed roots. And these are only a few instances among many thousands.

Dr. Henry S. Upson, a short while ago, made an interesting series of experiments which emphasized the importance of this work. He found among insane patients in Columbus and Cleveland asylums, many who had impacted teeth. Dr. Upson selected nine of these, and had their impacted teeth removed and their dental arches broadened.

The results were sensational. Six recovered their mental health, two were much improved, while only one patient showed no change. One of these defectives had been under constant restraint in order to prevent her from committing suicide. Another was a young boy who had developed pronounced criminal tendencies. Both made splendid recoveries.

Teeth Do More than merely Chew Food. So the dental apparatus has a much more complicated mission in life than merely to chew food. It is, in fact, a complex structure, with a whole hat-full of functions, into which enter not only the jaws, teeth, and dental arches, but also the muscles which move the jaws, the lips, and which influence the calibre and physiological functions of the nasal passages, and the hollow bones abutting thereon, together with the functioning of the palate and throat.

In addition to the functions of chewing and swallowing, the teeth are intimately connected with breathing and voice-production. A good wide palate, a roomy mouth, and a straight set of teeth are almost indispensable to a singer or a speaker—as many have found to their sorrow, when circumstances which they should have controlled made it necessary for them to resort to artificial teeth and a plate.

And anything that upsets metabolism or nutrition—as measles, scarlet fever, chickenpox, and other diseases accompanied by a high temperature—is extremely likely to affect the developing occlusion and soundness of the teeth.

Save the most Important Tooth. But the most frequent of all causes for irregular teeth and deformed jaws is the early loss of the first permanent molar—the so-called "sixth-year molar"—rightly characterized as the "Pillar of the Dental Arch."

Parents believe this to be one of the temporary teeth, and consequently pay little or no attention to its decay during the vulnerable "candy age"—which, unfortunately for all concerned, generally precedes the "tooth-brush age"—unless the children are early taught the value of mouth hygiene.

How the Loss of a Tooth Changes the Shape of the Head. This error arises from the fact that the first molar is cut while the temporary teeth are still in place. When it is lost, Nature makes a clumsy effort to close the space, with the result that the normal articulation of the teeth is utterly destroyed, and the remaining teeth are given a slant.

This produces overlapping, crowding of the teeth and triangular spaces, which afford lodgment for food particles, and furnish a snug harbour for the development of the bacteria which cause tooth-decay.

So, it is most important that parents remember

that the "sixth-year molar" erupts at about the fifth or sixth year. And also that it is a permanent tooth.

It may be recognized in this way. Remember that there are twenty teeth in the temporary set—ten in each jaw—and therefore five on either side of the jaw, above and below.

Now, begin right in the centre of the jaw, and count five on a side. If there is an extra tooth, you will know that it is a permanent one, and that it should never be extracted, if it is at all possible to fill or preserve it. For to remove this permanent tooth is to produce an irreparable loss.

The Bones of the Child are readily Moulded. Remember that the jaw-bone of the child at this age is soft, and very poorly developed—compared with what it will be later in life. And that this sixth-year molar, once lost, will never grow again, and may, by its absence, possibly cause great deformity of the jaw-bone.

For the loss of the sixth-year molars causes the shortening of the jaws and the crowding of the dental arches, due to the fact that the bony tissue of the jaws contracts. So the sixth-year molars,

whose work begins at once, and lasts as long as their owner, are the most important teeth in our heads.

Wrongly occluded teeth, as I have pointed out in another chapter, are also a frequent cause of Riggs's Disease. For, when the teeth meet improperly, they may "rock" back and forth, loosening themselves in their sockets. This interferes with their nutrition, and provides a favourable ground for the development of the pyorrhœal condition.

It is, therefore, extremely difficult completely to cure Riggs's Disease, unless malocclusion can first be corrected.

Remember that Teeth were Made to Chew with. When teeth are lost through necessary extraction, it is advisable to have restoration of these teeth as soon as practicable, thereby maintaining, as nearly as possible, a normal occlusion. Remember always that it is this masticating surface which is required in the grinding and triturating of our food—preparing it thus for the action of the digestive juices. Also, we have eaten, and are eating, entirely too much pap, mush, and semi-liquid foods, the mastication of

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William Beaham Smith

which is merely an act of courtesy—and therefore usually omitted.

Not enough force is applied to the jaws to develop the bones. Hence there is a lack of lateral widening. If the jaw-bones are not stimulated by the pressure of mastication there is a restricted growth of bone. It is only within recent years that we have determined that, in order to develop them, bones require exercise almost as muscles require work. This explains why malocclusion is relatively modern. Our rude forefathers used their jaws.

The "Rabbit Face." There are two well-marked and distinct types of faces that became so through mouth-breathing. One is known colloquially as "rabbit face," and has protruding upper teeth, a vacant stare, drooping eyelids, a short upper lip, a thin nose, and pointed nostrils, an undeveloped lower jaw and a retruding chin. Usually also the hearing is defective. Sometimes there is complete deafness.

The lower lip is thicker, and presses back against the teeth, while at the same time it pushes outward on the inside surfaces of the upper teeth. The constant pressure of these soft structures against

the teeth and jaw-bones acts as a powerful lever in forcing a faulty development of these structures. If the nose is also obstructed the force of the atmospheric pressure is absent, which is one of the chief reasons the nasal cavity remains undeveloped.

The "Whopper Jaw." In the other type, the "whopper-jawed" variety, while the nasal obstructions may have been removed, the removal was not done early enough to prevent the molar teeth from locking abnormally. In addition, these children usually have some obstruction at the base and the sides of the tongue, caused usually by enlarged tonsils. The lower jaw is drawn forward and downward by muscular action exerted in order to clear the mouth and throat. This ultimately crowds or jams the teeth, shortens the upper jaw, and gives an imperfect bite.

It seems difficult to believe that soft muscular tissue could influence such dense structures as teeth and bones, yet such is the case. The restraining force of the cheeks, lips, and tongue tend to keep in the straight and narrow path teeth which would otherwise wander far and wide. Should a tooth attempt to grow too far toward the tongue, the muscular pressure of the tongue

would—if there were nothing in the way to prevent—eventually push it back into line.

If the tooth took a notion into its head to grow toward the cheek or lip, these muscles would act to persuade the migrator to change its mind. While the muscular pressure is very gentle, it is constantly exerted—just as would be the light spring appliance of the orthodontist—and very effectively accomplishes its purpose.

It is estimated that about eighty per cent. of children are the victims of improperly placed teeth and the undeveloped mouths which result from them, and that one in five is a habitual mouth-breather.

What Thumb-sucking Does. Another frequent and inexcusable cause for deformities of the external and internal face is lip-biting or lip-sucking, tongue protrusion, or the pernicious habit of thumb or finger-sucking. If mothers realized the evil consequences of permitting their children to suck their thumbs for hours, they would break them of the habit—no matter at what cost to their own or to their neighbours' peace of mind.

This applies also to nursing nipples and "pacifiers."

The tender tissues of the infant or child respond to these continued pressures or pullings, and sometimes irretrievable damage is done to the child's mind and body. It will not do to put on mitts as a corrective, as biting and sucking upon these rough fabrics is even worse, if anything, than upon the fingers.

Some device, such as a celluloid or rubber ball, into which the hands are thrust, has been found excellent in preventing this thumb-biting.

As the child approaches the age when the permanent teeth should put in an appearance, there should be in evidence a progressive widening of the dental arch. Normal growth-spaces should appear—between the front teeth especially. If these spaces are lacking, and if the teeth are crowded together, there will be no room for the larger permanent teeth to come down—or up.

They are more likely to crowd in sidewise, or too far backward or forward. Gentle mechanical stimulation should be resorted to, in order to widen the spaces, and give the second teeth a proper chance to make their début.

If a permanent tooth is extracted, the space it occupied should be filled with an artificial sub-

stitute, so as to persuade the remaining teeth to remain in their own position.

When the first teeth are lost prematurely, their sockets may fill with new bony tissue sufficiently hard and dense, in many instances, to divert the permanent tooth from its proper course of growth, thereby forcing it to come in sidewise, or cater-cornered.

It might be here mentioned that the advice to wait until all the permanent teeth are in position before attempting orthodontic correction is a free translation of telling the parent to wait until the teeth get as bad as they possibly can get before applying a remedy to the trouble. The earlier the age the softer the bone, and the more rapid the results which are so much to be desired.

When to Begin Treatment. Between four and six years of age is a splendid time to begin. More can be accomplished in from two to two and a half years of treatment at this age than in four to six years at a later age. But all cases should be carefully watched until the age of twelve, no matter how early treatment may be instituted.

Between the sixth and the twentieth year the distance between the bottom of the lower eyelid

and the corner of the mouth should increase to between a third and a half. Also, there should be a relative growth from the ear forward to the middle of the upper lip. This development of the lower third of the face accounts for the difference between infant and adult features.

How the Nose is Twisted out of Place. Malformation of the dental arches has caused the septum of the nose to be twisted out of place or bowed, until the entire nose is out of normal alignment in respect to the other features. Occasionally this twisting progresses until the entire nose becomes too big on one side, and correspondingly too small on the other. Then the point of the nose points anywhere but where it should point—straight out from the middle of the face.

If the bulge in the septum is sufficiently prominent—and a little is a whole lot when it is inside of the nose—one nostril is restricted for breathing purposes—especially when its mucous membrane is congested and swollen from a "cold in the head," or some other source of irritation.

With this development of the jaws there is also a progressive growth behind the nose. For, inside the head, above the level of the roots of the teeth,

are many little spaces with bony walls. These range upward from the nose to the forehead, and backward to the bony casing of the brain. They are lined with mucous membrane. Air breathed through the nose—the only organ through which air should be inspired or expired—is warmed and moistened in these little cavities before being taken into the lungs.

Whatever interferes with the mucous membrane and causes irritation and congestion cuts off the blood-supply of the bone underneath, and stops its growth. Thus when the chest development of a rapidly growing boy outruns his nose development, in addition to promoting in him the habit of mouth-breathing, it forces an uneven development of the face. Needless to say, this is not desirable, and is not to be accepted as beyond remedy.

Painless, if Done slowly. It is practically conceded that orthodontia treatment is painless, if done slowly and with fixed appliances, which maintain a constant push or pull. There is no inflammation, and but slight irritation around the necks of the teeth being moved; which is not the case when appliances are used which set with a

twist of a screw or wire, and then, after an opportunity to adjust the structures to this tension, are given another twist.

There is a greater amount of pain also where appliances are worn which are intended to be removed while eating—the very time when most they are needed. Removing the regulators permits the teeth temporarily to resume their former bad habits, and when they are pulled and hauled again into their new position pain and inflammation are bound to result.

Of course, there may be considerable discomfort from orthodontia, but this is due usually to attempting to move too few teeth, or else through the wrong application of force.

The appliances should be attached to bands temporarily cemented into place. This prevents enamel friction through movement of the spring, and also makes for greater cleanliness by preventing the lodgment of food débris.

Slow work with constant tension, gives best results and is more permanent, because the little bone masons will have done a much more thorough job of removing bone material and building new bone substance with it.

For the Best Results. The benefits derived from this new science of training teeth in the way they should go are very numerous, and cover a wide range. Children whose health and mentality have been marvellously improved by orthodontia are living testimony of its value.

And not only in youth, but also in later life do these benefits count. Therefore, we may, without straining a point, and with due regard for truth, paraphrase an old adage by saying: "As the teeth are bent, so is the health inclined."

CHAPTER IX

PYORRHŒA—ITS CAUSE AND CURE

PYORRHŒA is an inflammation of the dental periostium, and the structures in which the tooth is imbedded, developing pus, and progressing to the decay of the tooth processes, and final loosening and loss of the teeth.

It is calculated that ninety out of every one hundred people in the world have pyorrhœa—or conditions which, if untreated, might lead to pyorrhœa—which makes this disease one of the most insidious of all human ailments. It is found even among savages, notwithstanding the generally held opinion to the contrary.

Pyorrhœa, like all other inflammatory processes, is dependent upon three primary factors—a lowered standard of nutrition, traumatic injury, and malocclusion of the teeth. This traumatism may be invisible; or it may be decidedly apparent.

Whatever the nature of the injury, the damage

to the blood vessels is so great that all the constituents of the lumen of the blood vessels pass into the vascular spaces between the blood vessels —followed by the usual changes characteristic of a true inflammation.

Up to this point the process is purely inflammatory. But when this inflammatory zone becomes contaminated by any of the pus-producing bugs, suppuration follows, and a local disorder is produced. This is the only condition to which the term "pyorrhœa" can be properly applied.

How Pyorrhœa Manifests itself. The first symptoms of pyorrhœa manifest themselves in a tendency of the gums to bleed under the slightest provocation—usually while brushing the teeth, or while removing impacted particles of food from between them with dental floss or toothpick.

As the condition develops, the gums shrink away from the teeth, thereby hastening the destruction by malnutrition of the sheath and alveolar process, the bony casing, and the nutrition chamber of the tooth.

How the Teeth are Lost. With the retraction of the gums and the destruction of the tissues

investing the root, the attachments of the teeth to the socket in the jaw are loosened. In advanced cases they become so loose in the sockets that sometimes they may be rocked back and forth, or even plucked out with the fingers.

And wherever the periosteum, or bony casing, is destroyed, the soft tissues attached to it are also destroyed—increasing the ulcerative process, together with the available supply of pus and pathogenic germs.

It must be emphasized here that where the membranes covering the roots of the teeth have been destroyed, or where the gums have receded, there is no earthly hope of ever replacing this tissue—by any form of treatment.

Mixing Pus and Food. And remember always that the pressure of mastication squeezes the accumulated pus from around the gum margins and the roots of the teeth, where it mixes with the food, and is swallowed. The pyorrhoic patient thus becomes a self-feeding, self-sustaining poison factory—constantly busy manufacturing fresh supplies of pus. These are absorbed into the circulation, or carried into the digestive and respiratory tracts—there to take advantage of any lowered resistance to start

the particular kinds of mischief best adapted to their germ-nature.

Try to Stimulate a Healthy Local Nutrition. If a healthy local nutrition can be stimulated, the disease process may be arrested, however, and some slight increase in the development of root-covering and gums may be expected: but these strikingly favourable results are the rare exceptions—not the usual rule.

The most Vulnerable Areas. In health, the oral mucous membranes offer a resisting barrier to keep germs from gaining entrance into the underlying tissues. The most vulnerable areas are the gingival tissues surrounding each tooth. So long as these remain in a healthy state, infection cannot break through. But when local irritants, such as impacted and decayed food-stuffs, overhanging fillings, irritating masses of tartar, and other foreign substances excite chronic inflammation of the gingival or gum tissues, resistance is lowered, and the normal tone of the tissues is lost.

So the various forms of gingival inflammation favour the development of pyorrhœal conditions, and open the way for invasion by the germs into

the deeper tissues, and from thence into the general system.

Keep the Gingival Tissues Free from Inflammation. If we could always keep the gingival tissues free from irritation and inflammation, they would invariably remain healthy.

While the treatment of advanced pyorrhœa is a very difficult undertaking, the prevention of pyorrhœal conditions is a most hopeful proposition. Oral hygiene, directed to restoring normal circulation to the congested gum tissues; the removal of all sources of local irritation—especially where this irritation extends down to the necks of the teeth below the gum margins—will prove most efficient in preventing the development of pyorrhœal disease.

Various Sources of Irritation. As we have seen pyorrhœa has its origin in mechanical irritation—in inflammation around the roots of the teeth, particularly of the "narrow-necked" variety—excited by ill-fitting crowns, over-hanging margins of improperly constructed fillings, or through stony substances (called serumal calculi), deposited from the saliva or the blood stream. Extensions of the tooth enamel also press upon the

gums, causing irritation and sponginess, which favour the breaking and entry of the pathological germs into the ramparts of the teeth roots.

If the Teeth Do Not Close Together Properly. I am also convinced that one of the principal causes of pyorrhœa is malocclusion or improper closure of the teeth. The failure of the upper and the lower teeth properly to oppose one another (because of anatomical malformation of either jaws or teeth) causes a "mis-bite." A mild form of rotation is maintained by the pressures of mastication, and this continued rocking of the teeth predisposes to their loosening, and to the invasion of their attachments by micro-organisms.

Teeth more Healthy when they Occlude properly. It is a scientific fact that when the teeth occlude perfectly—other factors being equal —there is invariably a more healthy condition of the teeth and gums.

Also, it has been my experience that where these irregularities exist, fully ninety per cent. of cases have been entirely neglected so far as concerns any constructive effort to close the spaces where teeth have been lost or extracted, and correct the faulty occlusion.

No dentist should feel that his work is finished when he has extracted a tooth. For no matter what the age of the patient, the jaw is never restored to normal again, until the space between the teeth has been filled, and the grinding surfaces are once more intact.

Not Necessary to "Kill the Nerve" to Put on a Bridge. It is not necessary to devitalize the teeth for this purpose, as comfortable and satisfactory bridges can be built for even the most unfavourable-seeming cases with the exercise of a little patience and ingenuity.

So I would impress upon mothers that, for the sake of the future health of their children, and as one of the most certain of all methods of preventing the subsequent development of pyorrhœa, that whenever they have found it necessary to have a tooth extracted, they should make it their business to see that, at the very earliest opportunity, this space is filled, and the valuable grinding surface restored, by the insertion of a properly fitted piece of bridge-work.

Five Thousand Pounds Pressure a Day by Our Jaws. It must be remembered that the weight borne by the grinding surfaces of the teeth in

twenty-four hours has been estimated at more than five thousand pounds. The pressure thus caused by the rise and fall of the teeth in the tooth sockets operates to squeeze any infective material that may be present in the tooth sockets or around the gum margins forcing it into the blood stream and the lymph channels—there to be carried through the circulation, to poison the structures of the body, and to manifest their virulency in those tissues that may show the least resistance to their invasion.

Some of the Things Pyorrhœa Does to Us. Among other effects produced by pyorrhœa are inflammation of the glands of the mouth and neck, suppuration of the tonsils, abscesses of the antrum of Highmore—the bony cavity between the top of the long-rooted canine teeth and the floor of the nasal cavity—infections of the nose and throat, and diseases of the middle ear.

The Germs Get stronger as they go deeper. It is a fact, also, that their virulence and their power to cause injury multiplies as these germs penetrate the tissues, and as they increase in numbers.

There are many, of course, who contend that

Riggs's disease is of systemic origin—arising in some depraved state of the metabolism, or from the presence of rachitis during childhood, or of tuberculosis, syphilis, diabetes, Bright's, or diminished alkalinity of the blood. All these conditions, in a way, do influence the development of pyorrhœa. But they are not direct causative factors.

Other authorities claim, with perhaps equally good grounds, that pyorrhœa is due to a neglected state of the exudates, secretions, and débris of the mouth, which subsequently develop a local inflammatory process.

With this clear conception of the inception and pathology of pyorrhœa, the reason why the dentist should always work hand in hand with the physician is definitely apparent.

The Meaning of Tartar. Associated with pyorrhœa there is usually, but not always, a tendency to form tartar deposits on the teeth, and especially on the necks of the teeth, down below the gum margins.

This tartar is merely the result of a combination of certain secretions of the mouth, mixed with mineral and organic substances derived from the

foods—usually in the presence of the pathological mouth acids.

By keeping the mouth secretions more alkaline —using baking soda, salt, or milk of magnesia for this purpose—much of this tendency to tartar formation can be prevented.

How to Treat Pyorrhœa. As to the first need in successful treatment of pyorrhœa, there is no question. It is necessary to scale thoroughly all calcareous deposits from the teeth—no matter how far up or down beneath the gum margins they may have extended—polishing and burnishing carefully all infected tooth surfaces.

Iodine Helps materially. Iodine, or some powerful antiseptic—used locally around the roots of the teeth, and at the gum margins, helps materially to asepticize the mouth—or at least to lower its toxic condition.

I have found also that chlorazene (Dakin's solution, generally referred to as Dakin's synthetic chlorine-carrying antiseptic) in one half to one per cent. strength, has given most excellent results—especially when used at home by patients for its local antiseptic action. I have also found that excellent supplementary treatment in con-

nection with the chlorazene is the aromatic chlorazene powder, which is coming into quite general use by dentists, and is especially recommended for home use. This powder, to my mind, is an ideal preparation for the patient to use at home, as it is really of powerful germicidal value, as well as being a most effective cleansing agent.

It is almost needless to say that the "Clean Out, Clean Up, And Keep Clean" practice is always a valuable aid in the treatment of pyorrhœa, as in the treatment of any other depraved state of the organism. For elimination is quite as imperatively demanded in a pus-producing process originating in the mouth, as it is in a pus-producing process originating in any other organ or structure of the body.

Bacterial Vaccines. Bacterial vaccines have found much favour in the hands of many experts on the treatment of pyorrhœa.

My experience, while favourable, has not been sufficiently extensive to warrant a definite statement at this time as to the actual value of the measure.

As with any innovation in dental or medical treatment, many hundreds of cases, with histories

extending over many months of time, must be given careful consideration, before a final decision as to efficacy or non-efficacy can be reached.

Emetine in Pyorrhœa. Dr. Eugene Lyman Fisk, Director of Hygiene of the Life Extension Institute, New York, believes that there is considerable evidence to prove that pyorrhœa is frequently caused by the presence of an amœboid germ, called "endemeba." The Life Extension Institute people claim that, in practically every case examined in this Institute, these endemeba are present, but what is more important, that they can be destroyed with emetine, which is the active principle of ipecac.

Ipecac and its principles seem to destroy these parasites quite as surely and certainly as quinine destroys the plasmodium of malaria.

The method usually employed is to drop three drops of the tincture of the wine of ipecac on a toothbrush, and brush the teeth thoroughly with this amœbacidal preparation. I have seen some very excellent results from this in my practice.

The "1-2-3" Mixture. Or the "1-2-3" mixture, recommended by Dr. Black, may be used. This consists of

Oil of cinnamon, one part,
Carbolic acid, two parts,
Oil of gaultheria, three parts

—a few drops to be used on the toothbrush morning and night—followed possibly by rinsing the mouth with a solution of hydrogen-dioxide, one part, to two parts of water.

How to Prevent Pyorrhœa. Pyorrhœa can be prevented by general care of the health, and by competent dental care. The gums should be treated surgically, removing completely all deposits of calculi and tartar. The occlusion should be made normal, and lost teeth should be replaced.

Dr. William H. Porter, Professor Emeritus of Pathology and Clinical Medicine of the New York Post-Graduate Medical School and Hospital, and author of *Eating To Live Long*, sums up the treatment of pyorrhœa in one brief sentence, which embraces the entire philosophy of successful pyorrhœa treatment.

Professor Porter says: "Keep the pus flowing, keep the surfaces clean, so that Nature will be enabled, by the germ-resisting action of the white corpuscles, to throw up a barrier, behind which the germs cannot thrive."

This is the beginning, the middle, and the end of all pyorrhœal treatment.

Give the Teeth and Gums Work to Do. Hard, crusty food, and green salads should be chewed, so that the teeth and gums may be given needed exercise, and the resistance of the gum structures improved.

Also, the gums should be massaged daily by the thumb and forefinger. This strips away the collections from about the gingival spaces, and stimulates a healthier circulation of blood in the parts.

There is no doubt but that a wonderful amount of good can be accomplished in the treatment of pyorrhœa, if this treatment is persistently and systematically followed out. But everyone who undertakes it must realize that it is a condition that calls for the employment of skill, resources, and infinite patience.

CHAPTER X

FOCAL INFECTIONS

TWENTY years ago the man who would claim that a little "gum boil" could be the direct cause of an attack of rheumatism in the big toe would have to dodge quickly, to avoid being haled into court on a writ of lunatico de inquirendo.

Yet in this gum boil—which indicates the presence of pus at the root or necks of infected teeth—may breed streptococcus viridans and the streptococcus hemolyticus, the staphylococcus aureous and albus, fusiform bacilli, and many other germs with many-syllabled names—capable, when properly distributed throughout the system, of producing grave pathological conditions in vulnerable organs and structures.

We now Know what Focal Infection Does. Thanks to the researches of Billings, Davis, Woodyat, Rosenow, and other physiologists and pathologists, and to the clinical experiments of Cotton,

of New Jersey, Dr. Eugene Lyman Fisk, of New York, and other clinicians, dentists, and pathologists, we now know that not only may these "focal infection points" at the roots of teeth and around infected gum margins cause rheumatism, but that they are also a factor in causing thousands of cases of Bright's disease and diabetes, diseases of the gall bladder and the respiratory passages, and gastric and duodenal ulcers.

They May even Block the Circulation with their Bodies. It was formerly thought that the evil results from focal conditions such as dental abscesses and pyorrhœa were due to the absorption of the poisonous substances formed by the bacteria, both living and dead—and the dead are infinitely more dangerous than the living.

But now we know that these organisms and their toxic débris, while being carried through the circulation, may, in addition to their inherent capacity for poisonous mischief, also cause a mechanical obstruction of the circulation—blocking up some of the finer blood vessels—thereby impairing the nutrition of such structures, as the joints, which haven't much vascularity—in other words, in which the blood circulation is deficient.

Chronic rheumatism is a manifestation of this type of action, which may be characterized by swelling and inflammation of the joints, or which may result in actual deformity and enlargement of the joints—as in "arthritis deformans."

We Didn't Find out about Rheumatism until 1914. This relation of infected teeth and rheumatism was first demonstrated by Dr. T. W. Hastings in 1914, and is considered by medical men to be one of the most significant discoveries of modern times. In fact, the very modernity of these findings will show why the general public has not yet become more familiar with this important work—although this fact does not, in the slightest, detract from the paramount importance of the principle.

How the Nerves may be Poisoned. The poisoning of the blood by these organisms also poisons the nerves—producing headaches, neuralgias, and nervous symptoms—as well as neuritis and other inflammatory or irritated conditions of the nerves.

What the Liver Thinks of It. The liver, unable to cope with the extra toxicity of the blood stream, develops chronic congestion, or torpor. It fails properly to strain the poisons out of the blood,

and we become "bilious" and lethargic, lacking in ambition.

Sleep fails to refresh us as it should. Food does not digest so well. The bowels become sluggish and inactive—increasing the general toxic condition, and adding to the debility and lack of tone.

Or the liver may ultimately become hardened and atrophied. So "hobnailed liver" may originate quite as frequently from the teeth of a teetotaler as it may from the fiery tipple of the toper.

Even Bright's Disease May Originate from Focal Infections. And similar ill effects may befall the kidneys or the pancreas—resulting in nephritis (or Bright's disease) or diabetes—if not directly due to germ activities, in any event, to their ultimate effects.

Frequently the germs which originate in decaying teeth or in focal infection points in the oral cavity develop "secondary foci" in the lungs, blood vessels, and other organs—which may be the cause of far more serious trouble than the original infection in the mouth.

Dr. Barker, of Johns Hopkins University, has reported a number of cases of pernicious anæmia (for which, hitherto, there has been thought to be

no cure) which cleared up after the extraction of infected teeth.

And Dr. M. L. Ravitch and Dr. S. A. Steinberg, writing in the Journal of the American Medical Association, claim to have secured remarkable results in the treatment of skin diseases, by according the teeth the attention to which they are entitled. It is particularly gratifying to refer to these authorities, as their results confirm similar experiences which have become almost routine in my practice.

Appendicitis from Tooth-decay. Appendicitis —according to Frank Billings—is usually caused by a strain of the streptococcus group of germs from a mouth or throat focus. This may seem rather a startling assertion, but there is much evidence to support the claim.

The primary focal points, where the germs make their initial bow to their unfortunate possessor, is a sort of culture tube for improving the strain of bugs by cross-breeding, as it were. For Dr. Rosenow has shown that in the mouth, tooth sockets, middle ear, and cavities of the bones of the face and head communicating with the nasal chamber—together with the tonsils—the most dangerous

infective germs are the pneumonia germs and the streptococcus, or pus-forming germ, found in a number of forms of blood poison.

A Germ Hatchery. These organisms, Rosenow declares, are capable of being transformed into germs of an entirely different strain, or into some intermediate form, and that these intermediate forms or strange strains, have special affinities for particular tissues in which they can best thrive.

Ideal Culture Tubes in the Head. In short, the tooth sockets, the hollow bones of the head, and other head and throat foci, furnish ideal culture tubes for the breeding of bacilli. The varying physical conditions of these foci—especially as to the amount of the oxygen present—(oxygen being an inhibiting factor in most germ development) determine the type, and also the final destination of the germs thus developed.

Only Three Billion Bacteria in the Mouth. Dr. Miller has estimated that there may be three billion bacteria in a neglected mouth—and almost sixty different varieties of these! In a mouth like this it wouldn't matter much whether pure food is pure or not.

For no kind of adulterated or disorganized food

could be any worse than the stuff the individual owning this mouth will finally swallow—after properly mixing it with tooth pus and a few million of his favourite bacteria.

So, decayed teeth may develop diseases of the eyes and ears, purulent conditions in the accessory sinuses—the hollow bones of the face and head—ulceration of the tonsils, and enlargement of the glands of the neck.

And "heart disease" produced by the formation of scar tissue on the valves of the heart, or by inflammation of its lining membrane, has been traced to infection arising in the mouth. While almost every other disease of a generally infectious nature has been demonstrated to have its source in some process of decay originating in the oral cavity.

These diseases are not only serious in themselves, but they may leave behind them trains of symptoms (sequellæ), which might later result in degenerative changes in the heart valves, in the walls of the blood vessels or in the structure of the liver, kidneys, and other vital organs—tending inevitably to breed organic disorders and a shortened life.

Bad Teeth and Goitre Found Together. Dr. William FitzGerald contends that in an experience with hundreds of patients he never yet has seen a case of goitre in which there was not originally some infection from a necrotic tooth pulp, or from the pus pockets of gums affected by Rigg's disease; while there is now no doubt but that innumerable cases of epilepsy have been traced to nerve irritation—either stimulated or excited by the presence of carious teeth.

Coughs, Colds, and Dyspepsia. The tendency toward recurring attacks of coughs and colds is invariably aggravated, and frequently developed, by a septic mouth condition.

Also, thousands of dyspeptics are made so and kept so by nothing more or less unæsthetic and inexcusable than the constant swallowing of pus from decaying teeth and gums—taken into the stomach with every mouthful of food and drink.

This, in turn, leads to anæmia, malnutrition, arteriosclerosis, and diseases of the blood vessels, and the lowering of vital resistance—which increases our vulnerability to all forms of infection. And there is no doubt but that many of the lesser ills of the body—taking the form of soreness of

the joints, tissues, muscles, and nerves—may frequently find their origin in some slight infection within the oral cavity.

Curing the Insane. The classical experiments of Dr. Henry A. Cotton, Medical Director of the New Jersey State Hospital, at Trenton, have proved also, beyond the shadow of a doubt, the destructive influences of focal infection upon brain functioning.

For, by recognizing the fact that mental disease may be the result of infections, and of the toxins due to focal infections, Dr. Cotton and his associates have been able to discharge 87% of patients admitted to the New Jersey State Hospital during a period of nine months. Whereas, during a period of ten years previous, the proportion of discharges to admissions was only 43%.

Saving Twice as Many from Madness. In other words, the recognition of the rôle played by focal infection, and the elimination of these focal points by appropriate treatment, has doubled the number of patients saved from life-long crippling of their reason.

What this would mean—were the same ratio of improvement to follow the systematic removal of

focal infections in every patient now confined in an asylum—could be readily computed, in terms of the actual number of patients helped.

But the *real* results—the definite restoration to mental health of the one out of every two mental derelicts now drifting inexorably toward the black gulf of physical oblivion—could be computed only by some bright angel, with a heart full of love for broken humanity, and a brain to comprehend the meaning of this restoration—to the derelicts themselves, and to the sad hearts of those who now mourn them as worse than dead.

How the Virulency of the Colon Bacillus is Stimulated by Diseased Mouth Conditions. Dr. Cotton, in discussing the subject of insanity and tooth decay in the *Journal of Dental Research*, says:

> In about twenty-five per cent. of our cases the teeth alone are the etiological (the causative) factor. In another group of about twenty-five per cent. both teeth and tonsils are involved, and have to be eliminated, if we wish to restore our patients. In a third group, about fifty per cent., the gastro-intestinal tract is also involved, with either the teeth or the tonsils, or both; and we did not get any results in this class until we were able to determine the types of infection, and establish means for their elimination.

One might with reason ask "why bring in gastro-intestinal infection in discussing teeth, a purely dental problem?" The explanation lies in the fact that the infected teeth, or the bacteria concerned in this infection, have a direct and very important relation to the pernicious activity of the colon bacillus. This organism occurs normally in the lower intestinal tract. Outside of its normal habitat (dwelling place) it is extremely toxic; it loses its benign character and becomes pathological.

To the question "what causes the benign colon bacillus to become virulent and migrate to other organs," we frankly answer, we do not know. We do know, however, that in the stomach, duodenum, and kidneys, it is usually associated with Streptococcus viridans; and it would be well within the range of probabilities that this latter organism, by its toxic influence, stimulates the colon bacillus to virulency.

Consequently, while apparently we can see no relation between infected teeth and intestinal infections of a chronic type, clinically there is a very close relation. It is well for the dental profession to recognize all the consequences and results of chronic root infection, and to end, once and for all, this far-reaching and dangerous type.

Treating Rheumatism through the Teeth. In the merely physical conditions the results of properly caring for focal infection are not less startling. In one of my patients, treated by Dr. Malcolm

Goodrich, an acute rheumatism had existed for three months—which condition absolutely incapacitated the man from any activity. The sufferings of this patient were so great that he had to be carefully watched, day and night, to prevent suicide.

Every joint in his body was involved in the inflammatory process—even his face and arms were swollen. He had not slept in more than three weeks, except under the influence of an opiate. Every conceivable form of medical treatment, including hot air baths and electricity, had been employed on him—without avail.

Yet, after the extraction of two or three necrosed roots, this man within ten days, was so far recovered as to be able to return to his business, and is today in perfect physical health.

Improving the Sight by Dental Work. A case of double astigmatism—with pains radiating from the eye-ball to the forehead and the top of the head—was relieved instantly, following the removal of a root imbedded in the gum tissue under an old bridge. This woman had lumps in her shoulder—little skin tumours—and had suffered for months from a persistent neuralgia. She asked

whether her teeth had anything to do with her condition. The doctors had told her that she had tuberculosis.

We examined her mouth, and told her that she had pyorrhœa, and some very bad tooth conditions. She was started on injections of emetine for the pyorrhœa, and told that certain of her teeth would have to come out. She was evidently scared into accepting this suggestion, so the teeth were extracted.

Almost immediately she said, "I feel better already."

The following morning she came in to have the sockets washed out. She entered in great excitement, and said: "Doctor, do you know you have restored my sight?" She pointed to the Æolian Building, a short distance from my office, and said, "It has been years since I have been able to see that building from this distance. You don't know what a change there is in me—all the world looks different. I have had to wear these double astigmatism glasses for years, but my eyes are all right now. I do not need any glasses."

This woman now feels that she has been given a new lease of life. There has been no recurrence

of the neuralgia or the headaches, and while she still wears glasses, the degree of correction is not nearly so great. I consider this altogether a most interesting case.

How "Nervous Wrecks" are Repaired. Another "nervous wreck" who suffered from chronic neuralgia, insomnia, pains in the head, and a general breakdown in all the functions of metabolism, and who found it utterly impossible to attend to even the most trivial details, was found, on X-ray examination, to have an infected area around an upper right molar.

This tooth was extracted. Since then this patient has had not the slightest recurrence of his trouble. It is the common neglect of these conditions that is responsible for thousands of cases of chronic disease, and hundreds of deaths, in every part of the country.

Helping the Head through the Teeth. One patient came in to have me remove gold crowns put in by some other dentist. While he was having this work done he suggested I fix up his mouth—replace missing molars on lower jaws, both sides, replace missing teeth on upper jaw, both sides, and replace missing teeth in front of

mouth. Before I use any teeth for constructive work, I always make a practice of taking an X-ray to find out condition of the roots as to location, shape, and direction in which the root lies. When I took this picture this man took it upon himself to say he never had any trouble with these teeth; that it was not necessary to take the X-ray. I told him he would have to be guided by my judgment.

When the pictures were developed I noticed a large area of infection around the root of the first bicuspid tooth on the upper left side. I asked this man how he had been feeling. He said his head had been bothering him so that it was necessary for him to give up business two or three days a week, go home, and do something for his head. Doctors could not find out what was the matter. They were making him take all kinds of treatment for headache.

When I saw the X-ray I recommended the removal of the tooth, to which he heartily agreed. After the extraction he felt almost immediate relief. I am happy to state we are still waiting for a recurrence of his headaches.

How to Clear up a Sallow Complexion. One of

the most striking cases I have yet seen was that of a former patient of mine, living in Albany. This lady, happening to read in the *American Magazine*, the article which introduces this book, —and not knowing that I was the dentist referred to in the story—wrote, asking my opinion of the truth of the article.

I replied by telling her that the article had been written by a patient of mine, and that, as a matter of fact, it was understated, rather than overstated.

The lady came to New York the following morning. I was amazed at her appearance. She was sallow, pale, and presented the aspect of being completely broken down.

She suffered from chronic rheumatism, the pain in her arms and limbs being almost constant, and, as she expressed it, she "was so tired she hardly had ambition to breathe."

I X-rayed her teeth, and found some badly filled root canals. I told her that she was being slowly killed by these poisoned teeth, and advised having them extracted, and bridge work inserted.

The teeth were extracted in October. I did not see the lady again until Thanksgiving. The change in her was nothing short of marvellous;

she did not look like the same person. For she was twenty years younger in appearance, her complexion was fresh and ruddy, she had had no rheumatism for weeks, and she felt and acted like a woman in the pink of perfect physical condition —which she was.

Only a Few of Hundreds. I have had literally hundreds of such cases—proving, beyond the question of a doubt, that many of the gravest systemic conditions, having apparently not the slightest connection with the teeth, are due simply and solely to infections arising from dead teeth—teeth improperly treated, or that should have been extracted years before.

Dr. Billings's Great Work. Dr. Billings, of Chicago, who has perhaps devoted as much attention to the study of focal infections and their consequences as any living man, has collected a tremendous amount of evidence on this subject.

It may be of interest here to give a few of the most striking of these cases:

Case I. Mr. C. F., aged forty-nine years, seen April 3, 1914, suffering from exophthalmic goitre for two years and frequent sore throat, shortness of breath, rapid heart; nervous, emotional; loss in

weight, lessened strength and endurance, muscular trembling. Many carious teeth, with alveolar infection shown by radiograph. Enlarged and infected tonsils. Tonsils removed, teeth extracted, rest and nourishing food. Result, May 12, 1914: Discharged much improved, goitre diminished more than one half, practically no symptoms as above described.

Case II. Man, aged forty-nine years. Irregular neart action, accompanied by pain and distress (angina), thumping of heart at night, waking him out of sound sleep. A very slight pyorrhœa was noted, but not considered of any importance. After three months, general treatment giving no relief, a radiograph of the jaw was taken, and three pus pockets were found. They were opened and drained. The heart symptoms promptly disappeared, and had not returned six months after treatment.

Case III. (Reported by Dr. Billings; of interest because of youth of subject.) Miss M. K., aged twenty-four years, admitted April 18, 1914. Chronic inflammation of finger joints, frequent tonsillitis, goitre, fainting spells, headache, and nervousness. Well nourished, good colour, tonsils enlarged and infected. X-ray revealed alveolar infection of four lower teeth. Treatment: Infected teeth extracted, tonsils removed, vaccine prepared from the organisms found in teeth and tonsils. Discharged, November 10th, much improved. January 18th, returned to work, general

condition good, joints much improved, goitre one half size.

Case IV. (Reported by Dr. Hartzell, of Minneapolis.) Man aged twenty-four years. In January, 1913, had an attack of sore throat, followed by pain and swelling, affecting one joint after another. Was confined to hospital nine months. No response to ordinary treatment. September 30th, radiograph showed abscess at roots of first and second molars. These teeth were extracted, vaccines made from the organisms found. January 13th, patient discharged from hospital, able to walk and free from pain, except on severe exertion.

Dr. Fisk's Suggestions. Dr. Eugene Lyman Fisk, in connection with these reports, says:

The lesson from these facts is obvious and the lines of prevention are well defined.

1. Beginning in infancy, a thorough physical examination and survey at regular intervals, in order to detect any possible focus of infection or any physical impairment that may lead to the formation of such a focus.

2. The practice of personal hygiene all along the line, in order that the general resistance to infection may be raised to the highest power.

3. Proper diet in infancy, which means, wherever possible, mother's milk, in order that there may be a regular and healthy development of teeth and jaws.

As the child grows older, the cultivation of normal eating habits, especially vigorous use of the jaws by thorough mastication, and the eating of hard, resistant, crusty foods every day.

4. The use of fruit in the diet between meals, especially apples, which mechanically cleans the teeth, and which by the action of fruit acids remove the mucin plaques that favour decay.

5. A thorough mechanical cleansing of the teeth with clean water and stiff brush, used with a rotary motion, not forgetting the tongue.

6. Thorough dental cleansing of the teeth at least every six months.

These are sound suggestions. They are in line with the strictest observations of science, and the most obvious applications of common sense.

Should Infected Teeth be Extracted or Treated? There is a wide range of opinion concerning the possibility of successfully treating apical abscesses —the infected foci at the apex of the roots. Many men take the conservative stand to the effect that most of these teeth can be saved by antiseptic treatment of the infected structures.

Some even go so far as to drill through the gums and the bone, amputate the point of the root, and try to clear up the condition by antiseptic methods.

Sometimes they succeed. For a time, anyhow, the area seems to be normal. The structures appear healthy, and the tooth gives good service.

What the Radicals Say. The radicals, on the other hand, hold that any attempt to retain teeth which are known to be diseased, is playing with fire. Dr. Grieves, recognized as one of the greatest authorities on this subject, says emphatically:

"There is to my knowledge no medicament, no method—germicidal, oxidizing, or electrolitic—that will revivify the pericemental apex (the covering of the point of the root). If it be vital, the tooth is healthy; if it be diseased, the tooth is next to doomed. This is the point in treatment where materia medica stops and tooth surgery begins."

Dr. K. H. Thoma, of the Harvard Dental School, has tried practically every variety of antiseptic that could safely be used in the gum tissues, and has found that not one of these has the power to destroy completely the bacterial life in the pus sacs at the roots of infected teeth.

Dr. Henry A. Cotton, in discussing this conclusion of Dr. Thoma's, states emphatically that "the sooner this fact is recognized by the dental

profession, the better it will be for the patient, and for the physician who later on sees the patient with some incurable malady.

The Conservative Middle Ground. As for myself, again I take a conservative middle course. Never will I sacrifice a tooth if there seems to be any reasonable possibility of saving it to a life of usefulness. If the involvement is not such as to cause immediate apprehension, and if there are no pronounced physical symptoms which would indicate the necessity for radical attention, I prefer to open up the abscess thoroughly, through the root of the tooth, and apply forma-cresol, or other powerful antiseptic, in the attempt completely to destroy the nidus of infection—all the while keeping the condition under close observation.

In hundreds and hundreds of instances I have secured absolutely satisfactory results—subsequently packing and filling the root canal, and restoring the integrity of the tooth with an inlay, a filling, or whatever form of reconstruction might be necessary.

In this respect my experience does not coincide with that of Dr. Thoma and Dr. Grieves, as many of these conservatively treated roots have re-

mained perfectly healthy and normal over a period of many years.

When the Involvement is too Great there is only One Course to Pursue. When, however, the area of involvement is too great, and when, in my opinion, the infection from this area is a source of menace to the health of the patient; or when there is already an appreciable amount of systemic disorder, I emphatically advise the extraction of the root, and a thorough curettement and extirpation of any diseased bone or peridental membrane.

For where the teeth are badly diseased, the roots eroded or frequently absorbed, or where the tips of the roots are necrotic (dead), there is, in my judgment, no other course that is safe—or even justifiable.

The Cautery Point as a Diagnostic Factor. Also, I have found that, in addition to the X-ray, the use of the electric cautery point, as advocated by Dr. William FitzGerald, has been of valuable service. Frequently, even when the X-ray shows but the slightest traces of shadow, the application of the cautery point to the necks of the teeth will elicit intense pain.

Whenever this occurs it is a certain indication

of the presence of serious trouble. For with sound, vital teeth, there is absolutely no sensation on circling the necks of the teeth with the cautery.

This is an aid to accurate diagnosis which, in my judgment, is almost invaluable to the dentist, as it is possible, by this means, to confirm a diagnosis that even by the most adept X-ray reading, might be otherwise obscure.

While the Results of Focal Infection are Admitted, perhaps the Real Cause isn't what we Think it is. I cannot leave this subject of focal infections and their relation to various constitutional disorders without a reference to the exhaustive and scholarly conclusions of my friend, Professor William H. Porter, on these matters.

Dr. Porter, who is recognized as one of the greatest living authorities on pathology and clinical medicine, holds opinions on this subject which seem to me to shed new light on the causative relations of these conditions.

A more Definite Understanding Needed. These conclusions define more accurately, to my mind, the nature of the process—particularly with reference to the generally accepted claims that focal infections are primarily responsible—or even seconda-

rily responsible through the development of new foci of infection—for nephritis, diabetes, and other organic deviations.

Dr. Porter takes the broad position that any individual, to be constitutionally affected by any pyogenic or septic process, must first have developed a susceptibility to infection, through a lowered state of resistance.

The virility and the number of his defensive phagocytes must first be reduced. And even then the introduction of pyogenic bacteria from an infected gum-structure or a diseased tooth does not suffice to produce bacterial suppuration.

A Normal Individual may be Relatively Immune. If, for example, bacteria find their way into the blood stream of an individual with normal bacteriacidal resistance, no infection results, because the bacteria are destroyed by the defensive agents within the circulating blood.

In order to develop suppuration and degeneration of the tissues the bacteria must be able to locate and propagate in some given structure. If infection occurs in this way, its development depends upon two conditions—the virulence of the germ, and the chemic state of the tissues.

In some individuals the vital resistance of the tissues may be so reduced—by local injury, or by some nutritional defect—as to furnish favourable chemic or physic soil upon which bacteria may grow, thereby rendering the course of the suppurative process especially unfavourable and dangerous.

If the bacteria which gain admission to the blood stream fail to find a favourable nutrient medium, they cannot multiply and exert their pathogenic action. In other words, there will be no reaction to their presence.

Classifying the Members of the Germ Family. Again, every group of micro-organisms may have innumerable family divisions, so to speak. Some of these groups are highly virulent, some mildly so, and some apparently almost inert.

If the inert family were put into a highly resisting and thoroughly nourished individual, there probably would be no deleterious results. Whereas, if the highly virulent type were introduced into a person of low vital resistance, an intense infection would likely be produced. Also, it is a well-known fact that different tissues have different degrees of resistance.

As a result of all these different factors, we get

almost innumerable varieties of clinical pictures—so much so that it is often difficult properly to class the condition.

Focal Infections Cause Nutritional Disturbances, and these Cause Degenerative Changes. This brings us to the crux of Professor Porter's argument. For, while the ultimate effect of the germ action may be the development of Bright's disease, or diabetes, or arthritis, or degenerative changes in the blood vessels, these results must necessarily follow—first, a lowered resisting state of the organism; and next, in the case of kidney, pancreatic or blood-vessel degeneration, a disordered state of nutrition.

This, according to Professor Porter, is due chiefly to taking into the system an excessive amount of proteid substance—more than the system can utilize. If more protein is absorbed than the system has use for, the blood becomes surcharged with proteids. This means that the epithelial cells of the kidneys must take up these substances from the blood stream, and eliminate them in some isomeric or transitional form, or else that they must be oxidized into some form in which they can safely be eliminated from the system.

If the oxygenating capacity of the system be exceeded, toxic matter will be developed from these proteids, which will have a profoundly irritating effect upon the kidney cells, and ultimately cause degeneration of the kidney structures—if the causative factor, excess of proteid in the diet, is not corrected.

Intestinal Putrefaction from Focal Infection. The second most frequent cause for degenerative changes in the kidney cells and other structures results from putrefactive fermentation so frequently met with in the alimentary canal. This fermentation of the food stuffs causes the formation of toxic substances in the intestine. The absorption of these into the system, and the attempt to eliminate them through the kidney cells, produces irritation, which if continued over a sufficient period of time, tends to produce degenerative changes in the renal cells.

How the Micro-organisms Act. The third cause of degeneration of the kidney structures results from the presence of micro-organisms, acting either directly or indirectly. Directly, as Prof. Porter clearly states, "when they are acting within the system upon the proteid structures,

which go to make up the integral parts of the body; indirectly when they are acting upon the proteid elements contained in the food products, while in the alimentary canal."

Dr. Porter concludes that:

In either instance the micro-organisms may produce toxic products, oxydation reduction products, or isomeric proteid elements. In the one instance they are produced within the system, in the other within the alimentary canal, to be absorbed therefrom in the circulation.

In either case the nutrition in general is impaired, and the kidneys are called upon to perform an excessive amount and an abnormal kind of work—hence their degeneration. It is further highly probable, if not absolutely proved in all instances, that different kinds of bacteria produce different kinds of toxic substances, either of the oxydation reduction type, or of the isomeric proteid form.

From all the evidence at our command, it is probable that, in the vast majority of cases the bacterial action, when it acts as an exciting factor in producing renal lesions (kidney disease), is brought about in the alimentary canal, and not within the system. It is the bacteria acting upon the proteid elements of the food stuffs in the alimentary canal that excites putrefactive changes, and thus indirectly, and not directly, the bacteria act as causative factors.

Insisting, as many of our focal infection enthusi-

asts do, that bacteria are in all cases the direct and only ætiological factor in producing organic lesions, seems like carrying the bacterial side a little too far.

Fundamentally a Disturbance in Nutrition. So, while it is undeniable that absorption of toxic products from focal infection may produce degenerative changes in certain organs and structures of the body, it would seem quite clear that they do not produce these changes of themselves, by direct action on these organs or structures—as is claimed by most of the advocates of the modern theory of focal infection—but rather by reason of the effect they have upon digestion and nutrition —and particularly upon the transformation of the proteid constituents of our food.

It isn't the Germ—It's what the Germ Does. Therefore, while the absorption of pus germs from infected mouth conditions may cause septicæmia or pyæmia, they do not generally, of themselves, cause Bright's disease, or other disorganizing changes in the organic structures.

And while any or all of these conditions ascribed to focal infection causes may and do result from focal abscesses, they occur because of the disturbances in nutrition, and because of the toxic sub-

stances developed as a result of these metabolic disorders.

Merely in the Interests of Accuracy. This may seem rather a fine line of distinction, but to my mind it is a most important one, as it shows that, reasoning in the most accurate way, on broad lines of pathology, that the conditions produced by focal infection are even more far-reaching than are at present generally believed. It shows also that the problem concerns the physician equally with the dentist; and that both physician and dentist should work hand in hand in the effort to overcome the grave results of these degenerative conditions.

It is not only a matter of removing sources of infection, but also of correcting abnormalities in the diet and recommending general hygienic precautions to be followed out by the individual.

In any event, if everybody in the world could realize the importance of this big question of focal infection, and take steps to correct the evil, one of the principal of all the causes of misery, suffering, and early death, would be avoided. And, thanks to the efforts of dentists, medical men, and scientific investigators, this now seems likely to be brought about.

CHAPTER XI

TEETH AND HEALTH

THERE is no question in my mind but that the most prominent of all focal infection causes arises from toxic tooth and mouth conditions. And also that the ramifications of these infections are as widespread as is the circulation itself.

We know, also, that on the twenty to thirty inches of our tooth surface, and in and between the teeth, as well as in the crypts and pockets about the tooth roots, germs are found by the millions—even in apparently healthy mouths.

How Dental Decay Starts. We know that in caries, or dental decay, placques or films of saliva form on the tooth surfaces, in combination with particles of carbohydrates. These placques are little igloos, sheltering myriads of bacteria, which develop acids that attack and break down the alkaline structure of the teeth. The sugary particles of the carbohydrates adhering to the teeth

also undergo fermentation. They develop lactic acid, which still further assists in dissolving out the lime salts of the teeth—leaving only the organic matter.

This is promptly attacked by pathogenic germs, and develops putrefactive decay. Tooth cavities form. These provide shelter, breeding places, and tooth-substance food for ever-increasing millions of bacteria—and these bacteria, entering the blood stream through the root canals and gum structures, infect the general system.

I cannot too strongly drive this lesson home, so that the real significance of the process will be appreciated.

Maybe you Have One of These Conditions. Innumerable cases can be cited to further illustrate these facts. For instance, one of the most prominent of the younger motion picture actresses consulted me only a short time ago to see if there was any dental cause for a condition that had been growing progressively worse with her for many months.

Her trouble seemed to be a condition of overpowering lassitude—a feeling of exhaustion—after doing her work at the studio. When opportunity

presented she would sleep mornings, sometimes as late as twelve o'clock. But inevitably she would awake, as she expressed it, "just as tired as when she went to bed."

An X-ray examination showed two infected teeth in the lower jaw. These were "cleaned up," and put in a perfectly healthy condition.

How Bad Teeth May Make you Tired. The improvement in this young woman's case was perfectly wonderful. She slept soundly. Her nightmarish dreams became a thing of the past. She awoke rested and refreshed in the morning. In fact, she improved so that, as she herself expressed it, she "felt like springing and jumping, instead of walking."

I cannot too strongly urge every man and woman who reads these pages, and who feels tired and debilitated; or who lacks "punch" and energy; whose appetite is fickle, and whose sleep fails to refresh them; to have their teeth carefully examined—by an X-ray if possible.

Don't Neglect Tooth-decay. If there are found any imperfectly filled root canals, any points of focal infection around the gum margins, or in fact any pathological processes anywhere in the

mouth, the nose, or the throat, go to your dentist, or your surgeon, and have him correct these without delay.

How Tooth Care May Lengthen your Life Many Years. It may make a difference of many years of life if you will see to it that the cavities of your head are kept in a thoroughly healthy state. Of course, there are no actual, hard-and-fast statistics on this subject, nevertheless, imposing and eloquent tables of figures compiled by the Life Extension Institute, and by various of the insurance companies, prove incontestably that there is a measurable increase in the average of life of individuals who are physically fortunate—or who are sufficiently intelligent or affluent to have all their sources of dental infection cleaned up.

Most people, accustomed to taking these evils for granted—because of the years of familiarity that have bred in them contempt and indifference—cannot realize that to have this work carefully done, and thoroughly to get rid of the festering spots of decay and putrefaction in the teeth and gums, as well as in every other germ-harbouring structure of the body, will set back the Clock of

Time for them, and keep the gnarled veteran with the long scythe cooling his heels outside their Door of Life for many enjoyable and profitable years to come.

The Dentist as a Beauty Specialist. Also, as a cosmetic, there is nothing in the world to equal a clean, wholesome mouth—both for what it does, and for how it looks while it's doing it.

I remember one case of a young girl of eighteen or twenty, whose face was chronically broken out with disfiguring blotches and pimply eruptions. This girl had taken all manner of tonics and blood purifiers without any permanent benefit.

I found, on examining her mouth, that she had a spongy growth of gum tissue, from which pus could be squeezed in alarming amounts.

Cleaning out a Pus Factory. A simple course of prophylactic treatments with iodine and emetine, applied by my dental nurse, supplemented by home treatment consisting of morning and evening mouth rinsings with a one half of one per cent. solution of chlorazene (Dakin's solution) cleared up this condition within two months.

And with the disappearance of the pus the skin and the general complexion improved, so that

today this girl has skin as translucent and perfect as any human being could wish for.

Better than Any Beauty Lotion. So there is not a particle of use for a woman to use salves, lotions, face washes, and blood purifiers to rid the system of something that is being manufactured around the roots of her teeth, or in her nose or tonsils, every hour of the twenty-four.

There is only one way to cure the condition; and that is to find the cause and remove it.

Boils and Carbuncles Relieved by Dentistry. I have had patients who suffered repeatedly from attacks of boils or carbuncles, but who were completely relieved of these recurrent conditions just as soon as the teeth were put in order.

How the General Health Depends on the Teeth. Kathleen Hills, writing for *Leslie's Weekly* on "How death lurks in the mouth," says about the cause:

> The human body is like any other delicate mechanism. It is a composite of separate units, all of which must be in good condition and perform their separate functions perfectly if one's health and mentality are to be the best. A watch will not keep correct time if the tiny hair-spring is bent; a compass will not be true if the needle becomes demagnetized, and one

cannot be well if all the organs are not functioning harmoniously. It is an unrefuted fact that the general health depends largely upon the condition of the teeth and oral cavity. Almost any systemic disorder, such as stomach and intestinal trouble, anæmia, and other blood disorders, diseases of the joints, heart and nerve affections, neuritis and neuralgia can arise from their neglect.

What the Famous Dr. Mayo Says about Tooth Decay. And Dr. C. H. Mayo, one of the two most famous surgeons in the world, says:

Diseases of middle life are increasing. They are microbic, of a chronic, recurring character, and are carried into the blood stream from a few foci, the mouth being the source of the greatest danger. A crowned tooth is not a crown of glory, and may cover a multitude of germs. Modern dentistry is relieving the world of much of its misery by watchful care of foci connected with the teeth, and the trend of modern medicine and dentistry is bringing their fields again closely together. Dentistry should be a department of medicine, as it is as closely associated with medicine as are the specialties of the eye, ear, nose, and throat, etc.

A Letter from Dr. Fisk. In a personal letter, Dr. Eugene Lyman Fisk says:

The feeling of our entire staff is that mouth infection should be rigidly searched for and uncompromisingly

dealt with. There are, of course, many instances where the removal of mouth infection does not have any appreciable influence on systemic conditions, yet we regard mouth infection as always a handicap, even for example, when the underlying condition is syphilis. The specific treatment for syphilis may not avail unless mouth infection has been eliminated. The same opinion holds good as regards any other condition and emphasizes the importance of giving attention to every region of the body and to other phases of hygiene in endeavouring to bring the individual to the highest plane of physical health and efficiency.

Crowded Teeth and Twisted Brains. As we have seen in a previous chapter, mouth-breathing, adenoids, and catarrh are a frequent result of the premature extractions and malocclusions brought about by neglect properly to care for and preserve the teeth. In the contraction of the dental arches, following the early and unnecessary loss of the sixth year molars—the "pillars of the dental arch"—the lymphatic circulation of the brain may be obstructed, which, in turn, may inhibit the proper supply of nutritive material to the brain.

Children, or even adults so affected, inevitably become dullards in their school or business life,

sometimes utterly lacking the power of attention and concentration. Many become incorrigible and delinquent, finally "winding up" in the reform school or the penitentiary.

Conservative medical authorities are now contending that more than one third of all the idiots and insane are mentally maimed because of contracted, deformed dental arches; by adenoids, and by the brain impoverishment that oral infections first bring about.

What Neglect Does. Dental neglect is usually begun in childhood, and continued consistently through life. The extent of the neglect can be better understood when it is remembered that, in a representative Cleveland school, out of 846 children examined, but 3 were free from diseased teeth; while in Chicago, of 90,000 school children examined, 95 per cent. needed dental treatment.

The condition grows worse with the years of the natural stress of tooth wear. But it is aggravated by the continued neglect to use prophylactic precautions, which neglect finally culminates in the development of caries, pyorrhœa, necrosis, or alveolar abscesses.

It must also be borne in mind that inefficient

dental work—showing in ill-fitting crowns, improperly filled root canals, and slovenly dentistry in general—is infinitely worse than would be the radical removal of the teeth themselves.

Any of our 52 Teeth Liable to Start Trouble. And this applies to all the fifty-two teeth that comprise the temporary and the permanent sets of teeth, during the entire time they may be in the mouth, from the earliest period of embryonic life, until they are lost at even the most advanced age.

For, if the tooth is lost, its potentiality for mischief is at an end. While, with indifferent dental work, the nidus of infection may start, and drain its toxins and virulent micro-organisms into the system for years, without its presence even being suspected.

The Little Pus Sac that Killed Roosevelt. Take the case of the late Col. Roosevelt as an example. A splendid up-standing American, in apparently the very pink of physical condition. And yet he was attacked by rheumatic fever, following the death of a tooth pulp or nerve, which became abscessed more than twenty years before.

The acute attack of the disease which originated

in the root of a tooth finally found complete expression in a pulmonary embolism. And that was the end of a great statesman—who died at least ten years too soon.

The Life Extension Institute, working in conjunction with the great life insurance organizations, has found this condition of focal infection to be so general that the middle-aged man or woman who has not one or more foci of infection in the oral cavity is the rare exception rather than the exemplary rule.

There is but one solution to the problem—prevention.

A Clean Tooth never Decays. If the teeth and the inter-dental spaces are kept absolutely clean and free from all particles of decomposing fermenting food, the development of mouth acids, and of the organisms that prey upon the enamel of the teeth will be prevented. I have found the Prophylactic Toothbrush best adapted for this purpose.

If tooth-decay is prevented, there will be no foci of infection—there will be no hordes of germs constantly swept into the lymphatics and the blood stream. There will be no destruction of

millions of defensive phagocytes, pitted in a never-ending battle with constantly encroaching enemies.

The individual will keep his teeth, will preserve his health, and will lengthen his life—by prophylaxis.

Just as eternal vigilance is the price of liberty, so eternal diligence is the price of tooth and body health. And this diligence must be expressed in **CLEANSING EVERY PART OF EVERY TOOTH, EVERY DAY.**

Remember that "**A CLEAN TOOTH NEVER DECAYS,**" but an unclean tooth may cost you your life.

CHAPTER XII

EPILEPSY MAY BE CAUSED BY TOOTH-DECAY

It is quite likely that certain cases of epilepsy may have their origin in some tooth condition, brought about by neglect properly to care for and correct what may have seemed to be only minor pathological tooth or gum conditions.

At least one such case has been reported to me by Frederick K. Ream, M.D., D.D.S. This patient suffered from headaches for fourteen years —headaches which greatly increased in severity, especially during the last five or six years. These attacks would be followed by typical epileptiform convulsions, lasting about a half hour, which would be repeated four or five times a day.

A Grave Nervous Disorder. This patient would feel attacks coming on while on the street, and would grasp at any one for support. At other times when he felt the same sensation he would leave his place of business, and often before he was able

to get home, he would be seized with a convulsion. He has been known to ride back and forth for hours—unable to leave the car with safety to himself.

Prior to coming under Dr. Ream's care the patient visited the neurological hospital, where he was kept under observation for a week. While no diagnosis was made, he was treated for stomach trouble. Complete X-ray examinations—gastro-intestinal, kidney, bladder, etc.—were negative. All blood tests were also negative.

A Typical Case of Epilepsy. The patient, during convulsive seizures, would exhibit a tremendous increase in physical strength—followed by periods of extreme weakness and depression. The diagnosis of epilepsy was made by Drs. Dillon, Bullwinkle, Weisbrode, Lamadrid, and Upham, of Brooklyn; Drs. Loumis, Goldberg, and Powers of New York; the Neurological Institute of New York; and another dozen or more physicians, scattered all the way from Philadelphia to Florida.

This patient received bromides, and the routine treatment for epilepsy—without benefit. He declined steadily in health, losing about twenty pounds or more in weight.

Every Epileptic Should Have an X-ray Examination. Finally an X-ray examination, advised by the physicians of the Neurological Hospital, showed two superior molars and the lower first molar on the left side with definite focal infection, associated with pyorrhœa. The teeth were pulpless, and the canals putrescent. The remaining teeth were pyorrhœic, but vital.

The three teeth mentioned were extracted by Dr. Ream. The result was a gradual diminution in the number and in the severity of the attacks, and after a period of six months, there was no further return of the trouble—the disease having completely disappeared.

Four years have now elapsed. The patient has gained twenty pounds in weight, and his mentality has been absolutely restored. The conclusion is obvious that even small areas of focal invection, gingivitis, or pyorrhœa, may become ætiological factors in grave systemic disease, and that the importance of mouth care can hardly be overestimated. Yet the solution to this—as to all problems connected with pathological oral conditions—is clear. It merely stresses the imperative necessity of prophylaxis—first, last, and all

the time—and especially in any grave systemic or nervous disorder, no matter what its origin may seem to be.

Chorea and Twitching of the Muscles Due to Decayed Teeth. Epilepsy and hystero-epilepsy, of course, are rarely met with in dental practice. Much more frequent, however, are those conditions of facial muscle twitching, sometime amounting to a violent contraction, with choreac symptoms—or even of paralysis of the muscles on the side of the affected tooth.

These are almost invariably relieved by correcting the pulp or the pericemental condition that first started them on their evil way.

Paralytic conditions from infected teeth have been known to extend to the arm, or even to the entire side. Occasionally, as recorded by Doctors Burchard and Inglis, they have been known to produce a general paralysis—all symptoms of which disappear after the removal of the diseased tooth.

One-sided Paralysis from Pulp Decay. Dr. Stellwagen reports a case where symptoms of partial one-sided paralysis followed after two molar pulps were capped—all symptoms disappearing promptly after the extraction of these teeth.

You May even Become Baldheaded from Bad Teeth. And Mounier, a French dentist, has even reported a localized loss of hair from dental disease. Two such cases of localized baldness recovered their hair-growing ability following the cure of pulpitis in one case, and the extraction of a dead root in another.

These cases show how the blood supply, even to the scalp, may be affected by dental disease, and only further emphasize that no root fragment should be left in the jaw after an unsuccessful attempt at extraction. For this root, deprived of its source of nutrition, cannot but act as a foreign body in the jaw, and may ultimately cause neuralgias, and other serious troubles.

Whenever there is a suspicion that a portion of the root may have been broken off and left in the jaw, following an extraction, an X-ray examination should always be made. This will clear up the matter conclusively, and a radical operation can be done—preferably under an anæsthetic, such as nitrous-oxide, or novocaine.

If your Eyes Trouble you, See a Dentist. Grave functional disorders of the eye may also originate in some pathological condition of the

mouth. These eye conditions are very painful and usually increase in proportion to the increase in the decay of the tooth tissue, or in the increase in the amount of pus absorbed from the infected gum structures.

Sometimes the disturbance is so intense that amblyopia, or functional blindness, may result. I have had several patients in whom a tremendous increase in visual powers was brought about by the removal of some septic tooth process.

Even Ear Troubles may be Caused by Tooth Trouble. Cases of suppurative disease of the middle ear, and even of deafness, have also been traced to carious teeth, and to the absorption of septic matter from around the roots of these teeth.

In many of these cases of deafness a marked increase in hearing power was brought about by the correction of some septic mouth condition.

Neuralgia a Common Result of Bad Teeth. Few there are who haven't, at some time or other, played host to a full-grown attack of that most obstinate of all nerve pains, neuralgia. While neuralgia may originate from any cause that produces either poison or pressure enough to irritate a nerve, its most common cause is toxic irritation

from tooth infection. And the quickest and surest way to overcome it is to correct the source of irritation in some one or more of the teeth.

Examine the Teeth in Chronic Headaches. Almost invariably those forms of neuralgia affecting the side of the face and head—particularly over the temples—accompanied by tenderness in the eyeball, are found to be due to some condition originating in the teeth. And, almost invariably, they disappear like magic on the removal of the cause.

Professor Porter's Prescription for Neuralgia and Headache. As a temporary relief—and frequently a permanent one—provided the headache or the neuralgia is excited only by an inflammation or a congestion of the nerve tissue, and not by a degeneration of this tissue—a combination of ammonol and caffeine, as recommended by William H. Porter, M.D., has been found to work wonderfully well.

Dr. Porter suggests a powder of fifteen grains of ammonol, with one half grain of citrate of caffeine—to be repeated in one hour, if not relieved.

This, I have found, is one of the safest and

surest of all the analgesics, and the least likely to produce depression.

Look for Impacted Teeth with the X-ray. Impacted teeth—teeth that have, because of "crowding" and irregularity, never had a chance to grow up out of the jaw-bone—are another frequent cause for neuralgia. This condition is more generally noted in connection with the lower third molars, not only because these particular teeth are the most likely to grow lengthwise in the jaw-bone, but also because the roots of molar teeth, while in this abnormal condition, are very likely to press upon the inferior dental nerve.

The diagnosis of these conditions is readily made by means of the X-ray, and when found, the removal of these impacted teeth is always imperatively demanded.

Ovarian and Uterine Neuralgia Also a Reflex of Tooth Trouble. It is a matter of record that many cases of ovarian and uterine neuralgia, and also of sciatica—as described in another chapter—as well as obstinate pains in the fingers, toes, and knee joints, have been found to have their source in dental irritation. This was evident when the

source of irritation and its consequences, were, by proper tooth treatment, removed at the same time.

Sometimes the Teeth Ache from Medical Causes. On the other hand, the teeth frequently ache in sympathy with something remote from them and their habitat, started by some cause that shouldn't have concerned them at all.

Of such a character are the "reflex pains," started by chronic malarial poisoning; gout, syphilis, diseases of the heart and blood vessels, pregnancy, diseases of the uterus, bladder, or kidneys, constipation, and la grippe.

Toothache from these causes, needless to say, can be permanently overcome only by appropriate treatment, at the hands of a medical man competent to properly diagnose and prescribe for these cases. Therefore, any attempt at "home treatment" must be merely palliative.

So the interdependence of tooth health and physical health can readily be seen. All these facts have been established by thousands of observations, at the hands of the most competent clinicians in the world.

Dental Caries a very Old Disease. Yet tooth decay itself is one of the oldest of all human dis-

eases; for in the skull of a mummy in the British Museum, dating from 2800 B. C., well marked evidences of dental caries may be seen.

It is, however, only within comparatively recent years that the relation between this disorder and physical disease has been recognized.

So it now remains only for the laity generally, and the dental profession, to awaken to the realization of the gravity of the condition—and to act accordingly.

CHAPTER XIII

WHY WE NEED AN X-RAY EXAMINATION

THERE is one sure and certain method of ascertaining exactly whether or not the roots of a tooth are infected; or whether a root canal has been properly filled or not—and this is by the use of the X-ray.

To illustrate this it is only necessary to remember that in all likelihood had that great statesman and sterling American, Theodore Roosevelt, only had a thorough investigation of his tooth condition by means of the X-ray, and had these teeth then been properly attended to by a competent dentist, Col. Roosevelt might still be alive, to give us the benefit of his sage counsel in these troublesome times.

The X-ray Will Tell the Truth about Dental Work. For the X-ray will expose faulty dental work, as well as pathological mouth conditions.

It will show us that an ill-fitting crown or a badly

placed bridge may cause serious physical consequences. And thousands of people, who now suffer from chronic ill-health, have it in their own power to determine the true cause of their troubles, and to have these troubles corrected.

For dental abscesses may exist for years without being discovered, inasmuch as there are no acute symptoms—except as indicated by the presence of so-called gum boils—to draw attention to the infected teeth.

So when the question is asked "How is a person to know that teeth which give no evidence of serious or dangerous infection are infected?" the answer is: "By the findings of the X-ray."

Progressive Dentists Depend upon the X-ray. Today there is hardly a progressive dentist who does not believe that the use of the X-ray is the greatest of all aids to accurate dental practice. For remember that blind abscesses and other focal infections may be present in and around the roots of teeth filled by even the most conscientious dentists.

It is only by the evidence of the X-ray, however, that any dentist—no matter how careful he may have been, can tell whether or not a root filling is perfect.

Teeth and Health

What the Editor Said. As my friend, the editor, quoted in the introduction to this book, says:

> All my life I had been paying for what I had supposed was first-class dental work, only to discover now that it was so imperfect as to be the root of all my trouble. Crowns in my mouth were leaking and secreting food that formed poisons; root canals, as the X-ray showed, had been only partially filled, resulting in abscesses. There were at least six so-called blind abscesses at the roots of my teeth—called blind because their presence was not indicated by any external swelling, and could be discovered only by the X-ray. Yet any one of them was draining sufficient poison into my blood to corrupt my whole system.

And careful investigators estimate that fully 79 per cent. of all root canals were imperfectly filled before the X-ray came into general use.

X-ray Examinations should be Made Possible for All. This, perhaps, is why it is impossible for poor people today to have proper dentistry done. For the expense in time, material, and overhead makes it impossible for the dentist to work with the proper spirit and interest, and give each particular operation the time that is necessary if the work is to be properly done.

The teeth of all patients should be X-rayed

where there is the slightest indication of any infection; where there is any suspicion as to the vitality of a tooth; to insure root canals being properly filled; and to make certain that the incoming teeth of children have sufficient room to come properly into place in the jaw.

The Municipality Should Establish X-ray Clinics. I am firmly convinced that there should be a clinic or dental infirmary, where poor people could go and have the work of any dentist checked up by means of an X-ray diagnosis.

For there are so many people of limited means who spend what little money they can afford in order to have their teeth put in what they suppose to be good condition, only to find out, after a short time, that the work has not been properly done—that it has to be all done over again, at their own expense, by some other dentist.

If these persons lack the means to have this second operation done—and unfortunately this is too often the case—they simply continue to suffer from the consequences of the inferior work, and finally resort to extraction.

I have found in my practice that more systemic trouble arises from bad dentistry—done through

carelessness, or because the dentist was inefficient —than even the most pessimistic person would think possible.

The X-ray Film must be Checked up. Most well-equipped dentists today do their own X-ray work, for the reason that radiographs alone cannot be depended upon for dental diagnosis. The film must be studied and interpreted, first and foremost, by a dentist who is accustomed to such work. And this must, in turn, be checked up by an actual physical examination of the mouth, before an accurate decision can be arrived at.

Why we Have More Infection than our Fathers Had. In fact, paradoxical as it may seem at first glance, the very improvements in modern dentistry have made possible the development of more dental abscesses than could ever be achieved in our fathers' and our grandfathers' days. For when our ancestors had a very bad condition of tooth-decay, the teeth were extracted, and that was the end of *that* chapter.

Now, however, we can do the most extensive kinds of tooth repair, and save teeth which, by all the laws of health, there should never have any attempt been made to save. So that under-

neath expensive and extensive bridge-work, and under cunningly contrived dentures, there may develop a condition which is an actual menace to the life of the individual.

What the Metropolitan Life Found. Dr. Thaddeus B. Hyatt, of the Dental Section of the Metropolitan Life Insurance Company, has presented some figures illustrating the extent of these menacing conditions.

In an examination of 2537 teeth with non-vital pulps, Dr. Hyatt found 1404 showing putrescent conditions in the tissues surrounding the roots.

Indeed, X-rays of filled teeth often show that "false channels" have been filled; while the normal channels, if crooked or tortuous in their "direction," have been left unfilled, thereby inviting infection.

Dead Teeth a Source of Danger. Dead teeth of this description cannot but prove to be a source of grave danger. Unless they can be properly filled, they should be removed, and their places filled with an artificial denture. In fact, all dead teeth should be watched carefully by X-ray means, for signs of infection. If they show the slightest signs of causing trouble, they should

be immediately attended to—even if this necessitates extraction.

Some Doctors and Dentists still Regard Infection as Unimportant. It is to be greatly regretted that, in spite of the overwhelming mass of evidence proving the harmful systemic effect of mouth conditions many physicians and dentists refuse to take these matters seriously. Tooth abscesses are so common, and are so often unaccompanied by general symptoms, that these men are led to look upon them as unimportant.

Yet the Life Extension Institute has gone on record as stating that a complete X-ray examination of the upper and lower jaw is one of the best forms of life insurance a person could possibly take out.

Of the last two hundred cases examined by X-ray in this Institution, 135 or 67½ per cent. showed indubitable evidences of mouth infection.

Two Hundred and Five Foci of Infection in One Hundred and Thirty-five People. The total number of abscessed and infected teeth found among these 135 people was 205. The number of teeth improperly filled and requiring immediate dental attention was 193.

All these patients had been under what they

fondly imagined was competent dental care, and had spent considerable money in having dental work done. Yet their failure to have an X-ray examination permitted these grave infectious conditions to pass unnoted.

How Bladder Trouble was Cured. Dr. Fisk, in commenting upon this, says:

Perhaps the most essential feature of the periodic examination is the X-ray, without which the discovery of some sources of physical impairment would be impossible. An instance of its value is the story of a man who was suffering severe rheumatism and cystitis. He had severe pain and had lost weight very much before coming to the laboratory. During the examination it was discovered that, although, most of his teeth were gone, he had still about half a dozen, all of which were loose, and he wore a plate. An X-ray of his teeth showed that all of them were abscessed, which caused a continuous drainage of poison into the system. He was advised to have his teeth out. Ten days afterward he returned to the Institute. His rheumatism and bladder trouble had practically disappeared and he no longer suffered pain. After six months it had not returned. Infected teeth often cause rheumatism, as almost everyone knows, but the interesting feature of this case was that the bladder trouble apparently also came from the same source.

Disease of the Eye Due to Faulty Teeth. One of the most unusual cases, as illustrating the value of the X-ray in aiding correct diagnosis, has been reported by William H. Haskin, M. D. Dr. Haskin says:

A New York policeman had been under treatment at the Manhattan Eye and Ear Hospital for seven months for a disease affecting both eyes. Some time after his eye treatment began he had two dental bridges anchored to four teeth. Upon return to the hospital the condition of the eyes became greatly aggravated. Radiographs were taken of the teeth which revealed marked infection about the four teeth. They were immediately extracted. The result was most startling. All pain disappeared within twenty-four hours, the inflammation began to subside, and the policeman returned to duty seventeen days later.

Have your Teeth X-rayed. These are significant results. They cannot fail to excite profound interest in all those who still retain sufficient self-interest to warrant their seeking all the scientific aid available, in order to preserve their lives, and their physical efficiency.

There is no more pain or physical discomfort in having an X-ray photo taken than there is in

having any other kind of a photo taken. I can only urge everyone who has the slightest suspicion of any condition which an X-ray might disclose, to go at once and have it disclosed.

In no possible way could they do themselves and their family a greater kindness, or a more definitely remunerative service.

CHAPTER XIV

HOW ZONE THERAPY RELIEVES TOOTH PAINS

(Data furnished by courtesy of Drs. FitzGerald and Bowers.)

It may seem a perfectly ridiculous proposition, on the face of it, but the fact remains that by strong pressures, exerted by the finger, or by therapy zones—which are spiral steel springs—or by rubber bands applied tightly around the joints of the fingers, pain can be relieved, and sometimes entirely mitigated.

This relief depends for its success upon a proper understanding of the zones and their relationship, a proper selection of the methods employed, and persisting in the attempt for a sufficient length of time.

Where to Press for Results. If the cheek immediately over the aching tooth be caught between the thumb and the index finger or else squeezed tightly against the gums for three or four minutes,

very frequently the pain of toothache—provided it is not due to the exposed pulp—may be completely relieved.

Better still, if the gums over the roots of the aching tooth are grasped firmly by the index finger and the thumb, the results are even better, as, in addition to the zone therapy relief, there is also a manifest "blocking" of the nervous impulse. Indeed, extractions of teeth, and even the removal of impacted teeth, or the excision of a portion of necrosed jaw-bone, have been painlessly done under this form of anæsthesia.

Even Pressure on the Fingers Will Frequently Work. But even finger pressures exerted over the first or second joint of the finger corresponding to the tooth involved, may give most satisfactory results. It is merely required that one remember that pressure upon the thumb, forefinger, middle and ring fingers of either hand will control correspondingly pain in the incisors, cuspids, bi-cuspids, and the two molars on either side of the median or central line of the jaw—providing that there is no great amount of inflammation, or no abscess in the vicinity of the corresponding teeth.

Occasionally the control overlaps, in which case it is necessary also to use the finger next to the zone finger. In fact, in order to make assurance doubly sure, it may not be a bad idea to band or otherwise treat the two fingers contiguous to the finger which actually controls the particular zone involved.

How Long to Maintain Pressures. These pressures should be maintained from five to ten minutes—by the watch. If they are made on the fingers they should be persisted in until there is a very definitely defined bluish discolouration of the finger tip being operated upon.

The proper application of these principles cannot fail to be of immense value to the dentist and oral surgeon in their daily practice. In relieving toothache and neuralgia, in removing deposits, in preparing cavities, and, in fact, in most painful operations which dentists are called upon to perform, this pressure technique is invaluable, as many dentists are learning every day.

And further, the application of these principles will inevitably encourage public interest in dentistry, and will materially diminish the sum total of pain and suffering that humanity is called upon to endure.

As Dr. Charles H. Riggs remarked, "It is most common—and highly gratifying among the many dentists now using zone therapy—to have sensitive patients, those upon whom, because of past exhausting experiences, they have always dreaded working—say: 'Well, Doctor, if you never hurt me any more than you did today, I shall never again fear to come to you.'"

How Mothers May Apply the Knowledge. Mothers will find this method a safe and certain means of relieving themselves and their children of an immense amount of pain and discomfort. For, while they cannot, of course, hope to possess the technical knowledge enabling them to find and exert pressure upon the nerves themselves as dentists do, it is a comparatively simple matter for them to rigidly grasp the roots of an aching tooth between their thumb and finger, and by firm pressure maintained for five minutes, temporarily relieve pain—at least until they can take their child to the dentist.

If this may not seem feasible, they can, by remembering the fingers that correspond with the particular zone it is desired to influence, do much to relieve distressing conditions in that zone until

such time as the dentist can be visited, by squeezing, or by applying rubber bands around, the proper fingers.

Squeezing the Second Finger for a Pain in the Molar Tooth. For example: at a dinner party the other night, one of the guests complained of severe pain in the right upper first molar. A dentist present told her to squeeze firmly the joint of her second or middle finger, which advice she considered a very ill-timed and pointless joke. The dentist, insisting that he was seriously and helpfully disposed, persuaded the lady to obey instructions, and in a very few minutes she beamed complete relief from her dental anguish.

Curing a Travelling Man's "Sore" Teeth. Another instance in which toothache was relieved in an unusual manner is reported by Dr. J. Roemer, who operated with a pair of rubber bands upon the aching teeth of a young travelling man. Dr. Roemer stated that this man came to his office with an extremely painful and sensitive condition, chiefly affecting the incisor teeth. As the Knight of the Leather Bag explained it, his teeth were so "sore" that he could not eat any solid food whatever, and he didn't much relish

the food he drank. A dentist who had examined the salesman could find nothing wrong with the teeth, from the dental standpoint.

The Meaning of "Sensitive Spots." Dr. Roemer, however, examined the man in a characteristic zone therapy way. He searched the patient's fingers with a metal comb, to find out what was the matter with his teeth. This search disclosed the presence of "spots" on the inside of the thumb and first finger which were acutely sensitive to pressures from the teeth of the comb.

The diagnosis established, the treatment was simplicity itself. The doctor merely applied rubber bands about a quarter-inch wide and two inches in length, binding them around the first joint—counting from the tip—of the thumb and first finger. These he left on until bluish discolouration appeared, with instructions to remove and re-apply several times daily.

The travelling man reported the following day that he had enjoyed a good night's sleep—the first for many nights—and after forty-eight hours of this treatment he telephoned that all pain and sensitiveness had completely disappeared.

Curing Neuralgia by Finger Pressures. In

neuralgia and other painful conditions of long standing, where there are no decayed teeth—or other dental causes for the pain—many permanent cures have been effected by pressure treatment. Almost it would seem that whatever tends to reduce the pain also helps to remedy its cause, no matter how remote.

As illustrating, in detail, the successful "home treatment" of neuralgia, a recent case reported by a Western physician is most interesting. The doctor says:

I saw recently a patient with trifacial neuralgia of two years' standing. Nothing had relieved it permanently. The attack which brought him to me was of four or five days' duration. During this time he had been unable to eat. Even the attempt to speak would bring on an acute paroxysm of pain of a sharp, piercing nature, which radiated over the entire left side of the face, extending from the lower and the upper jaw, and up into the left eye. These paroxysms left him as "limp as a rag."

Better than Having the Nerve Cut. He had been advised to have the nerve cut, as offering the only relief for his trouble. I applied rubber bands on the joints nearest the tip of the thumb and forefinger of the left hand, which zone, of course, corresponds with the left side of the face which was affected by the neuralgia.

In less than ten minutes my patient was talking and laughing, and we had quite a visit. I told him nothing about what was being attempted with the bands, so he wasn't "hypnotized." After we saw results, however, I instructed him to apply the bands every half hour, if the pain continued, and as it decreased, to lengthen the interval of the application.

When next I saw him, several days later, he laughingly said, "Oh, I apply the rubbers once a day now, as I don't want that pain to come back." He is now enjoying life better than he has for years, thanks to "those fool rubber bands," as his daughter called them.

Any Pressures Good, so Long as they are in the Proper Zone. Pressures made with the thumb and index finger on the lower jaw (externally) in the zones corresponding to an aching tooth, are frequently helpful.

Every zone in the body may be covered in its entirety in this manner. The thumb should be firmly hooked beneath the under surface of the chin, the fingers exerting a counter-pressure on the lower outer surface, in order to get the best results.

Many patients find that the severity of pain of many minor dental operations can be very greatly mitigated if they press firmly the appropriate

finger and thumb tips on the arms of the operating chair, during excavation, scaling, or other rather painful treatment.

Sometimes pain in the jaws may be greatly desensitized by packing tightly the outer half of the auditory canals with slightly moistened absorbent cotton.

How Points of Infection Manifest Disturbances in Remote Sections of the Body. One of the most significant facts in connection with zone therapy is the intimate relation between morbid dental conditions and pain, or even pathological changes, in practically every section of the body. It has been demonstrated beyond a shadow of doubt that points—or foci—of infection within the mouth, or in the teeth, frequently manifest disturbances most remote from their point of origin.

This is one reason why many physicians and surgeons, using the method, make a routine practice of sending every patient, in whom dental disease is even suspected, for a thorough overhauling by a competent dentist.

Curing Sciatica by Extracting a Tooth. This may be better illustrated by quoting a case reported by Dr. James A. Lawton, of Middletown, Connecticut.

Zone Therapy Relieves Tooth Pains

Dr. Lawton says:

I was called to the hospital to examine the teeth of a patient who had been suffering from sciatica of the right side for two months. A dozen physicians had exhausted their ingenuity in prescribing, and could not lift the pain except with morphine, which was usually given at night to induce sleep.

After three months of this the physician in charge decided to have the patient's teeth examined, and I was called in.

Finding an Impacted Molar. The patient was a woman of about forty-five. I found her in bed, unable to move without exciting severe pain in the right leg and hip. I examined the teeth, and found them in remarkably good condition—no cavities, and all fillings in good shape. Naturally I examined the right molars, all of which were sound, but I noticed that the lower right third molar (the wisdom tooth)—which is in the same zone as the sciatic nerve—was impacted.

The anterior cusps were caught on the distal aspect of the second molar, and the posterior cusps were projected above the jaw. Thus we had the roots of the third molar forced backwards, exerting a constant pressure in the zone which found its expression in the ready sciatic nerve.

Anæsthetizing a Tooth from the Finger Tips. I decided on extraction, using pressures over the finger joints, and later directly on the inferior dental nerve. After three or four minutes I removed the tooth,

without the slightest particle of feeling on the part of the highly nervous patient, who all the time had been calling for a general anæsthetic.

The nurses expressed astonishment, and when the patient turned on her side to expectorate she was still more amazed to find that there was no pain in her leg. Her sciatica was cured immediately. Nor did it recur. And three days later she was discharged from the hospital. This was four years ago, and there has been no more sciatica in her case.

You can readily understand that, with hundreds of reports of similar cases from all over the country, that zone therapy is extremely valuable as a diagnostic aid, as well as a valuable method of treatment. I may say also that I have noticed in using zone therapy in extractions, that there is a marked decrease in post-operative bleeding.

Relieving a Patient over the Telephone. Not infrequently great pleasure and satisfaction is afforded both patient and dentist when some sufferer calls up on the phone at two or three in the morning, and inquires what finger to put a rubber band on in order to relieve the pain of a certain tooth, especially when the advice given has been followed by relief.

It has been for many years a quite general piece of knowledge among dentists—as well as

among well-informed laymen—that the application of menthol to the mucous membrane of the nose, on the same side as an aching tooth, will very frequently stop a toothache. If dentists, and mothers generally, will now apply a slight elaboration of this bit of zone therapy technique to relieving toothache and neuralgia, they may secure some very surprising results.

And if the results are not up to expectations, there will not have been the slightest particle of harm done in trying, anyhow.

CHAPTER XV

MOUTH WASHES, TOOTH PASTE, APPLES, AND TOOTHBRUSHES

WHILE ninety out of every one hundred people in this country—and heaven only knows what percentage more in other countries—are more or less keenly in need of dental attention, yet it is also a fact that the reading public—through newspapers and magazines, government leaflets, Life Extension Institute Publicity, and other sources of information—is being made acquainted with the necessity of tooth preservation.

This is not alone from the standpoint of the cosmetic effect, but also from the standpoint of better mastication, and of the important part that sound teeth play in developing sound health, in increasing physical and mental efficiency, and in facilitating a better work output.

The Good Effects of "Toothbrush Drills." By the hundreds of thousands, in school clinics,

free dental clinics—such as the Rochester and the Forsyth Infirmaries—in "toothbrush drills," in lectures, moving pictures, in the industrial dental infirmaries, and by lesson leaflets this message of oral prophylaxis is being driven home.

The general public who can afford dental attention—and these are all too few under the present lack of provision for caring for the financially decrepit—are awakening to this need for dental service.

Scientific Dentistry a Recognized Need. So that today, among hundreds of thousands of progressive American families, provision is made for the yearly fees of the family dentist, quite as a regular and legitimate item of expense; and more and more the public is learning to value the dentist for what he means to them.

The movement popularizing oral hygiene has probably made more progress during the past five years than during the past five hundred years. The aggregate of money spent for mouth washes, dental pastes and powders, articles for the dental toilet, and toothbrushes must run into the millions of dollars annually.

The amount of good these do cannot be com-

puted—except in terms of lives, happiness, and health—and in that tremendous sense of satisfaction that comes to individuals who are trying—in their humble way—to make themselves as wholesome and unobnoxious as possible.

All about Mouth Washes. Perhaps the most generally-used agent in this connection is the "mouth wash"—either alkaline, or the so-called "antiseptic" or else a combination of both alkaline and antiseptic.

For the alkaline mouth wash there is a great deal to be said, because of the fact that most of the pathological germs of the mouth breed in an acid medium. Consequently, when the acid secretions of the mouth are neutralized by rinsing with an alkali, the medium in which the germs may propagate is decidely less favourable for their rapid growth.

The Alkaline Mouth Wash. Of these alkaline mouth washes, perhaps salt and water—a teaspoonful of common table salt to a glass of water—used morning and night, is one of the best known and most generally effective; although soda bicarbonate—common baking soda—in the same proportion, is claimed by many to be even better.

Mouth Washes

I have found in my practice that a teaspoonful of milk of magnesia, rinsed through the mouth, so that every part of every tooth is bathed in this alkaline fluid, is the most effective of all mouth washes.

The milk of magnesia prepared by precipitation has given particularly satisfactory results, in my experience, due probably to the fact that a perfect suspension of colloidal magnesium hydroxide—a chemical combination of magnesia and water—is secured. This not only neutralizes the acidity, but also leaves a protecting film of magnesia over the surfaces of the teeth, which protects these organs. It helps also to preserve the alkalinity of the oral secretions—sometimes for as long as four or five hours at a time, soothing eroded surfaces.

Other alkaline mouth washes that have proved very effective are alkalol, glyco-thymoline, borolyptol, and several other well-known preparations.

Mildly Acid Mouth Washes. Hydrogen dioxide is used by many, and, in proportion of one part to two of water, it acts as a very efficient germicide. In my experience, however, the continued use of any mildly acid preparation tends to excite undue

irritation and sensitivity of the necks of the teeth —especially if used in conjunction with a brush that is even moderately hard in texture.

The same thing is true of listerine, also a mild acid, but nevertheless a very excellent antiseptic mouth wash.

It is the general concensus of opinion, however, that mouth washes have but a superficial effect, and cannot, in any way, take the place of an agent qualified to produce a thorough mechanical cleansing of the tooth surfaces.

Chlorazene the Most Effective Germicide. So far as its antiseptic action is concerned, however, there is no doubt but that chlorazene (the solution discovered by Dr. Dakin, and introduced into general use in the Allied Armies by the famous surgeon, Dr. Carrell) is one of the very best of all mouth washes.

This solution is particularly effective in helping to overcome pus formation in pyorrhœal conditions —just as it overcame pus formation in the suppurating wounds of our soldiers during the Great War.

How Chlorazene Acts. Dr. W. H. Dixler, in a paper read before the Pittsburgh Odontological Society, says:

The action of chlorazene is an intensely germicidal one, having a store of chemically combined chlorine in a form which is non-irritating and non-toxic. When brought in contact with proteins and blood serum micro-organisms and pus, it readily parts with its chlorine to the basic substance, immediately exerting its antiseptic and germicidal action.

We found that it performs this chemical action without irritation, and that it does not coagulate albumen, nor does it interfere with the digestive action of trypsin of protein, but it does actively disintegrate protein, and influence a flow of lymph, thereby cleansing the wounds, which is one of the most important features in wound sterilization. We are inclined to believe that necrosed tissue is dissolved and liquified, so that it may be carried away by drainage or absorption, and in this way the germs on the clean surface of the living tissue readily are exposed to its germicidal action.

It has been found that a one in one thousandth solution of this chlorazene is more effective than a five per cent. solution of carbolic acid, and is absolutely non-toxic and non-irritating.

The home use of this solution consists in the patient rinsing the mouth with chlorazene of a one half to one per cent. strength, morning and night—holding the fluid in the mouth for at least a minute or two, in order to secure the maxi-

mum germicidal action. And, if only a small amount—four to eight ounces of the solution—is made up at a time, there is no reason why it should not keep perfectly, without deterioration.

What to Do for Bleeding Gums. For sore and bleeding gums I have found that a home-made solution of

Alcohol, one part,
Vinegar, one part, and
Water, eight parts,

is an ideal preparation. This will overcome the trouble, usually within a week or less, and wonderfully improve the local nutrition of the gum structures.

Stomatitis Blisters. Where there is a tendency toward ulceration or "stomatitis blisters" I have found lemon juice an admirable corrective. Used freely, several times a day, it heals up recurrent mucous patches that resist all other forms of treatment. This is simple, absolutely harmless, and is well worth a trial.

A Corrective for "Bad Breath." In the disagreeable exhalation and fetor from decayed teeth

or septic tonsils, so common with many, I have found that

Thymol, eight grains,
Alcohol, one fluid ounce,
Glycerine, four fluid drams,
Solution of formaldehyde, eight drops,
Water, to make eight fluid ounces,

used as a mouth wash, will give almost certain results. This solution should be in the medicine chest of every pyorrhœic, and in fact, should be used by every human being who has a reverent regard for the olefactor sensibilities of the army of his fellows with whom he is brought into intimate daily contact.

Brushing with Warm Water not Enough. Some authorities claim that for all ordinary purposes brushing the teeth with warm water, after each meal, and before retiring, should be sufficient. This, in my experience, is not sufficient.

I am willing to admit that strong antiseptics, carrying carbolic acid, chlorate of potash, or irritating essential oils, in solution, might prove harmful on continued use. But even these preparations have their place, and, under certain cir-

cumstances, are admirable. Their use, however, should, in my opinion, be first sanctioned by a physician or a dentist. They should not be used indiscriminately by patients.

Tooth Pastes. Many eminent dentists decry the use of tooth pastes on the grounds that some of these preparations contain substances which experience has taught us are admirably adapted for the development and propagation of bacteria.

It is true that many of these preparations do contain gelatine, sugar, soap, flour, and even honey—substances which are mince pie and ice cream to the busy bugs responsible for tooth decay. Also, many tooth pastes, in order to prevent hardening in the tube, contain viscid substances of some character—usually gum tragicum. It is undeniable that germs might find these substances admirable culture media for luxurious development.

Yet it is also a fact, borne out by experience in millions of cases, that all these substances may be thoroughly rinsed out of the mouth after the teeth are brushed; consequently they cannot form any source of permanent danger based on furnishing means for germ growth.

Tooth Paste

Hold Fast to that which is Good. Therefore, if you have found a good tooth paste which does not abrade the enamel of the teeth, which cleans thoroughly, which leaves the mouth with a pleasant sense of freshness, and which rinses out thoroughly—leaving no mechanical or sticky deposits to irritate the gums—go right ahead and use this. For it cannot possibly do any harm. And the good it will undoubtedly do will vastly overshadow any ill effects which theoretically might ensue from its use.

Tooth Powder an Ultra-modern Dentrifice. Many of the leading dental authorities now contend that only by means of a tooth powder is it possible to secure absolute cleanliness of the tooth surfaces. For the process of removing film, dental placques, and stain from the teeth is largely a mechanical one.

It is highly necessary, therefore, that the dentrifice have a definite amount of abrasiveness, so that it may "bite" and "grip" the material to be forcibly removed.

Yet the powder must be free from grit, infusorial earth, and other substances insoluble in water or the mouth fluids.

I have found calox tooth powder to be ideal in this connection—inasmuch as, when wet with water, or moistened by the mouth fluids, it instantly develops milk of lime and hydrogen dioxide.

This solution neutralizes the acids largely responsible for dental caries and erosions; while, at the same time, acting as a powerful bactericide—destroying the germs and oxydizing decaying particles of food on which the germs feed.

This powder also develops nascent oxygen. It is alkaline; and its ingredients are perfectly soluble. All of which attributes make it a dentrifice that is scientifically conceived, and, in my experience, dependably effective.

Dental Floss and Toothpicks. I have spoken elsewhere of the use of dental floss as being preferable to the employment of wooden or quill toothpicks—and infinitely less likely to injure the delicate gingival tissues. I need only repeat a word of caution in reference to the tendency of many to use the floss carelessly and roughly, wounding the gum structures, and causing more or less profuse bleeding—a process which favours amazingly the development of pyorrhœa.

The Benefits of the Toothbrush. There have

been many attempts lately to inveigh against the time and tradition-honoured bristle toothbrush. In a recent editorial in the *Journal of the Indiana State Medical Association*, the objection was raised that the toothbrush, as ordinarily employed, with its stiff, sharp bristles, not only produces unnecessary injury to the gums, but that it is in itself a filthy, unsanitary, and unhealthful toilet article.

It was argued that a rubber brush, or a rubber finger cot, with fine rubber projections, but blunt and soft enough to be free from the possibility of injuring the tissues—and above everything else, capable of being kept sterile—should take the place of the ordinary toothbrush.

This has not been my experience. I am still old-fashioned enough to believe that a toothbrush with bristles sufficiently stiff to remove the food débris from between the crevices of the teeth, and yet not harsh enough to cause abrasion of the gum tissues, is the ideal cleansing implement for dental use.

The Anatomically Constructed Toothbrush. I have found the prophylactic toothbrush, with its pointed bristle tufts, admirably adapted for this

purpose. For it is anatomically constructed to fit all the dental curves, and to reach every angle and crevice around, between, and behind each tooth.

The correct use of this brush, following the careful use of dental floss, I am convinced, will effectually remove food particles which otherwise might be left to putrefy and start decay.

The tuft on the end of the brush penetrates between the teeth, where ordinary flat or curved brushes might merely "hit the high spots." And the curved handle of the brush helps in this good work.

How to Brush the Teeth. The teeth should always be brushed "longitudinally"—from the gum margins to the points of the teeth, below and above, inside and outside; and then brush laterally—but carefully, so as not to irritate the gum tissues.

Many authorities advocate that after using a toothbrush, it be dipped in common table salt, and the salt left on the brush to dry. This, they claim, prevents the decay of any food particles that may be caught between the close bristles of the brush. Also the small amount of salt left in the brush after rinsing, and before using again,

helps somewhat to harden the gums, and asepticize the gum tissues.

I am not partial to this method of preserving food débris from decay, for it is infinitely better to consume these products and get rid of them.

This is done when an oxygen-generating tooth powder is used, as the oxygen developed by its contact with water effects the "oxydation reduction" —or burning up—of these food particles which might otherwise decay in the brush, and become a source of possible infection if the gum tissues are lacerated by the bristles.

Don't be Afraid of Chewing Gum. One of the outstanding facts in connection with the modern conception of tooth preservation is the increasing use of chewing gum by our adult and juvenile population.

It is certain that, from infancy off, many of us have drifted into the "pap" habit, eating largely of those foods that can be taken with a spoon and on the run. This explains why a perfect set of teeth is almost unknown among modern Americans.

In the days when we ate plenty of roughage—when we were forced to chew our food before we dared attempt to swallow it—we had teeth like

rocks. For we gave them plenty of exercise. We strengthened the muscles of mastication. We stimulated the normal secreting power of the salivary glands. And we insured for the starchy elements of our food an adequate supply of ptyalin—the starch-converting ferment—lacking which the starch cannot be properly digested.

How Chewing Gum Prevents Dyspepsia. Thousands of the most aggravated cases of fermentative dyspepsia—with the gas formation and lactic acid development which accompanies this very prevalent condition—have their origin in this dietetic crime of "pap" feeding and food bolting.

And this condition, in its turn, is the father and mother—as well as the grandparents on both sides of the house—of headaches, insomnia, nervous troubles of all kinds, constipation and auto-intoxication, and a whole flock of distressing symptoms that sometimes lead to really grave systemic disorders—such as rheumatism, kidney disease, blood pressure, and other organic conditions.

It is for this reason that physicians and dentists now quite universally recommend gum chewing—in addition to the more careful mastication of the food—as an aid to securing a better and

more complete conversion of the starches into dextrin.

It has been found that this has a more definite effect in overcoming these digestive troubles than any amount of the diastatic ferments, which used to be prescribed as an aid to the relief of all these obstinate troubles. And a package of gum is much easier to take than a bottle of diastase.

Gum Chewing Aids Tooth Nutrition. Also, dentists have found that the exercise of gum chewing brings about a better nutrition of the teeth, for the reason that the act of masticating a piece of gum forces the stagnant blood out of the spongy structures surrounding the teeth, and provides a better quality of nutrition from the fresh blood brought to these vascular structures.

The cleansing action of the gum in the interstices of the teeth, and on other parts of the teeth not readily reached by the toothbrush, is a definite benefit to these organs, helping to keep them free from the accumulation of micro-organisms and fermenting particles which might lodge in the crevices between the teeth, and cause their decay.

So, good chewing gum is excellent for bad digestions. It discourages the activities of harmful

germs, which might otherwise take a lease on favourable niches in the dental structures. And it affords an effective system of calisthenics for teeth and gums that otherwise might deteriorate from an insufficient amount of proper exercise.

Prevents Gas Formation. Therefore, while the ruminant habit may not be commendable from an æsthetic standpoint, it is far less objectionable than a perfectly terrible breath; or the constant belching of gas; or the manifold evils that accompany digestive deficiencies.

It is a habit that may have a pronounced effect in increasing our mental and physical efficiency. And any habit that increases our efficiency, and decreases our deficiency, is a habit that is well worth shaking by the hand, and inviting to a reserved seat, right down in front, next to the jazz drummer.

Fruit Acid Beneficial. Also, the use of fruit or fruit juices after a meal is held by many to be an effective help in preventing tooth-decay. For the acid coagulates the mucin films; while the increased flow of saliva tends to prevent these films, and the tartar which frequently originates in them, from forming—at least, until they can be brushed away.

Fruit Acids Beneficial

Dr. Harry C. Barnard, Chairman of the Food Division of the American Chemical Society says:

> An apple eaten in the evening will mechanically and chemically clean the teeth, and protect them from bacterial ravages in the night, when the most damage is done.

I am convinced that there is much truth in Dr. Barnard's observation, and that the adoption of the practice of apple eating cannot fail to have a beneficial influence on the teeth.

What the Dentists and the Public Owe the Dental Manufacturer. And, hand in hand with the progress of dentistry, has gone the perfection of the means whereby the dentist has applied his technique. For without the marvellous devices which cunning mechanics have conceived and constructed, and lacking the improved means of tooth-care and tooth-repair which the canny manufacturer has evolved, the dentist of today would be hardly more advanced in his art than was his brother of the time of Horace Wells and Simpson.

It is to the dental manufacturer, as well as to the dentist, that the great public of the world is indebted for deliverance from what has, through all

the harried years of recorded time, been considered among the most frightful of physical experiences—the ordeal of the dentist's chair.

From the crudest and most primitive appliances have been evolved the delicate, almost human instruments that bring the blessed surcease of relief to countless millions.

And so, I believe the great good accomplished by the dentist, and the skilful artisan who has made his work possible, will live after them, while the halting efforts by which they gained their heights of achievement will be interred with their bones.

CHAPTER XVI

THE DENTAL DISPENSARY IN INDUSTRY

It needs no ghost returned from the tomb to tell us that a man cannot wholeheartedly nurse an aching tooth with one hand and run a power-lathe with the other. Nor can even the most conscientious girl accord polite attention to a customer while a refractory molar is stabbing her brain into frenzy with pain impulses.

Hence, perhaps the most important and thoroughly constructive innovation of modern times is the establishing of dental infirmaries, in connection with industrial enterprises. For the service rendered in these clinics not only ameliorates active pain, but prevents conditions which, if untreated, might subsequently develop grave physical disorders, resulting from the absorption into the system of products of tooth and gum decay.

In fact, the benefits arising from the installation

of these units are now so obvious as to excite the universal query, "Why in thunder didn't we do this before?"

An Enterprise of Mutual Benefit. The outstanding feature of the arrangement, however, is that it benefits the employer quite as much as it helps the employee. For it is merely a matter of a little arithmetic to figure that if relief from toothache or from some acute dental condition can be secured by a visit to a competent dentist right on the spot, a saving of several hours can be affected which might ordinarily be consumed in an appointment with a busy dentist in general practice. This, entirely apart from the immense saving in dental fees to tooth-harried employees.

In fact, one large industrial enterprise which has recently installed a free dental dispensary for its employees, has figured that from January 1, 1918, to August 1, 1918, the time saved by men who had work done at the dental dispensary amounted to an aggregate of 25,300 work hours.

Twenty-five Thousand Three Hundred Dollars Saved to Employees of One Plant. It is calculated that a visit to an outside dentist consumes an average of four hours. The time spent in the

"immediate attention service" at the plant is not deducted by the company. Therefore, the saving to employees whose minimum wage is one dollar per hour amounts to $25,300.

If this huge sum was saved the employees, it is only fair to assume that the employers saved an even larger amount—making of the enterprise a profit-sharing venture of unquestioned value. This further implies that the spirit engendered is spread to the home, and through the community in which the operatives live. All of which fosters an infinitely better "feeling"—resulting in the undertaking becoming a definite social asset.

So this welfare work is one of the most significant movements of modern times. It is being adopted as an efficiency measure by many of the leading industrial organizations throughout the country. And the time saved, the higher degree of physical efficiency secured, and the splendid increase in the morale of the employees, is making the venture a noteworthy one.

The Work of the Metropolitan Life Insurance Company. The Metropolitan Life Insurance Company, with its twenty-six thousand employees, has been one of the first in this field. It has re-

cently been made a ruling in this Institution that every Home Office employee shall undergo a dental examination, and a thorough cleaning of the teeth twice a year.

If the services of the family dentist are preferred by the employee, such examination and cleansings by him will be accepted, provided they are procured without expense to the corporation—the employee furnishing from this dentist a satisfactory certificate that the required work has been done.

The Dental Dispensary of the Metropolitan Life is furnished with the latest type of dental apparatus, and maintains a superintending dentist, five assistants, an X-ray specialist, and seven lady attendants—all employed on full time.

This dispensary was established in July, 1915, and has proved one of the most valuable assets to the medical department. A small charge is made for services, to defray actual cost of material and overhead, which amounts to an average charge for each patient of approximately $2.33 per year.

How the Dental Infirmary Saves Lives. The life conservation value of the work can be better appreciated when it is remembered that during

the year 1917, fifty-two deaths were traceable among industrial policy-holders to infections, originating in the teeth and gums.

These conditions caused blood poisoning, inflammation of the membranes of the brain, inflammation of the ear, necrosis of the bones of the jaws and head, inflammation of the lining membrane of the heart, derangements of the stomach and bowels, and joint troubles resulting from "blind abscesses," pyorrhœa, and ulcerations of the gum.

The R. K. Le Blond Tool Company is another of fifty odd corporations in the United States which operates a full-fledged dental clinic, somewhat along the lines pursued by the Metropolitan. The inauguration of this work is a welfare feature greatly appreciated by the workers, in addition to being a distinct benefit to the company, because of a more uniform attendance of operatives at their work, as well as in the maintenance of the good health which is essential to conscientious work.

With the corporation it is an obvious efficiency measure, inasmuch as the improved nervous force, and the decreased number of hours lost because

of preventable illness makes for a more stable strength among employees—which reacts to the mutual benefit of both employee and employer.

Stop Decay before it Decays. For all decay is stopped before it has any chance to do permanent damage. Consequently there is no loss of time from work, which might otherwise be caused by toothache, or other troubles due to dental neglect.

In the Dayton-Wright Airplane Company, Dr. H. D. Millhoff, the dental clinician, since January, 1918, has saved the firm an average of 21,031 hours in the labour of the four hundred men and women employed in the plant.

Dr. Millhoff attends frequently as many as thirty-five cases of toothache and toothitis in a single morning's work.

Educational Lectures at the National Cash Register Company. At the National Cash Register Company, of Dayton, Ohio, Dr. H. M. Brewer, in addition to dental service, gives a series of educational lectures, illustrating the benefits of oral hygiene, and the advantages of periodical dental prophylaxis.

The National Lamp Works of the General

Electric Company, employing more than ten thousand operatives, is among the foremost in this new activity. This firm furnishes free service to all employees. Already it has thirteen dental dispensaries in successful operation at different plants, while an addition of five more units is now planned for. The services rendered by the Company dentist embrace prophylactic and emergency work, and advice on dental hygiene.

It is the concensus of opinion among the executives that in no other work in which the company is employed is there so much general satisfaction felt, or more immediate return shown. In fact, the rapid extension of the number of units is, in itself, evidence of the profitableness of the service.

The Constructive Nature of the Work. Dental work performed for this class of patients—especially in the field of prophylactic or preventive dentistry and mouth hygiene—is largely outside the field of profitable dental practice. For unless the employees were attended to in the dispensary, they would, in the ordinary course of events, receive little or no dental attention.

The laity, as a rule, fail to appreciate the tremendous importance of tooth-decay, and its direct

influence upon physical decay. Therefore, the work of the industrial dental clinics, in driving home these facts, and in removing and correcting these conditions, is a wonderful step in the direction of health and life conservation generally, and a national asset of supremest importance.

A Marvellous Efficiency Measure. It has been estimated that it costs an industrial plant anywhere from ten to three hundred and fifty dollars properly to educate an employee—depending upon the character of the work performed. It is therefore obvious that there is a huge balance in favour of keeping an employee physically fit for his work, rather than to permit him to become incapacitated by means easily preventable.

There are, of course, no accurate figures showing the exact saving to employers and employees through this service. But the aggregate of this saving has been computed at anywhere from twenty to thirty per cent.—depending upon the character of the work performed, and the average salaries paid.

The expense of the installation and operation of these units varies according to the nature of the services rendered. The cost of the equipment

runs from eight hundred to twenty-five hundred dollars a year. Where a dentist is employed on full time, the salary ranges from twelve hundred to four thousand dollars a year. The woman assistant or nurse receives a salary of twenty to thirty dollars a week.

The Expense to the Worker only Fractional.

The per capita expense varies from eighty cents to three dollars or even five dollars per annum—again depending upon the kind of service rendered. Some institutions furnish the clinical outfit and pay the salaries of the dentist and his assistants, while the expense of the material used is divided between the firm and the pension or welfare association.

In some instances, notably that of the Macy Mutual Aid Association, and the joint Board of Sanitary Control for members of the International Ladies' Garment Workers Association, the expense is borne entirely by the employees.

Many institutions furnish tooth powder and tooth brushes free—while subsequent supplies are charged for at cost.

Some firms, such as the H. J. Heinz Company—who furnish free manicure service for all employees

handling food stuffs—take the very liberal and intelligent view that it is quite as important for an employee to have a clean mouth—free from pyorrhœa and focal infections—as that he or she should have clean hands.

The company, therefore, provides the services of a dentist to insure this commendable condition of cleanliness among its employees—merely as a good business investment.

Caring for the Kiddies. Many companies, as for instance, the Colorado Fuel & Iron Company, the Williams-Pocahontas Coal Company, the Jenkinsjones Fuel Company, and others, maintain dispensaries, which supply service to the children of employees, and to the school children located in the mining camps. It was found that ninety-eight per cent. of these children were in need of dental attention.

The constructive effects of such a service can only be appreciated by those who have made a study of the grave physical and mental defects which may and do develop as a result of dental neglect. As a factor in the health and life conservation of the coming generation, the value of this altruistic service is almost incalculable. In

fact, it may truly be said that the interest which is being exhibited by great industrial organizations in every part of the country in this splendid work bids fair to be one of the most important contributions to preventive medicine ever undertaken.

It is to be sincerely hoped that the scope of this work may be amplified, and that the inauguration of this service may be extended—until every considerable manufacturing and industrial plant in the country will maintain, as an integral part of its equipment, a clinic in which the dental and medical welfare of employees will be a factor, dictated by policies of head and heart.

CHAPTER XVII

FREE DENTAL CLINICS—THE COUNTRY'S GREATEST NEED

FIVE years ago, the city of Bridgeport, Connecticut, inaugurated a system of dental hygiene in its public schools. Last May Bridgeport checked up its results.

The first thing noted was that the cost of re-educating children who had failed of promotion to higher grades—which, in 1912 had been 42% of the school budget—fell to 17%—which was an actual saving of money to the tax-payers, who pay the bills, of more than 59%.

Decay of the teeth in fifteen thousand children was reduced by one third. If it were for nothing else than the item of suffering alone which this innovation prevented, this result would prove the experiment worth while.

Fifty Per Cent. of Failures Prevented. Failure to pass examinations for promotions were

reduced fifty per cent.—a startling gain in school efficiency.

The death rate from scarlet fever, diphtheria, and measles was reduced more than seventy per cent. because thousands of decaying areas and foci of infection had been cleaned out of the mouths of these school children.

During the influenza epidemic of 1918, the death rate in Bridgeport was the lowest of any city of its population in the United States—in large measure, because of the increased resistance to disease, built up by oral prophylaxis.

Favourable Experience Universal. This experiment of Bridgeport is relatively duplicated wherever dental hygiene has been generally adopted in schools. So hundreds of schools, all over the country, have now established dental clinics, in most of which attendance is made compulsory.

And invariably the reports show that after these clinics have been in operation for a long enough period to warrant a test of comparison, marked improvement is manifest in both the mental and the physical condition of pupils.

If they Can't Assimilate Food, they Can't As-

similate Knowledge. In fact, it is only obvious that children who are unable properly to assimilate food—owing to decayed teeth, or no teeth—or to defective vision, adenoids, or diseased tonsils—are terribly handicapped in assimilating knowledge, no matter how expensive the school building may be in which this knowledge is dispensed, nor how carefully chosen the teaching staff.

It is greatly to the credit of the dental and the medical profession, that in almost every part of the country they are eagerly co-operating in this work of oral hygiene—as carried on for the benefit of school children.

The Greatest Social Need of the World Today. There is no doubt in my mind but that this is the very greatest social need of the world today. It is a constructive work—a work that will accomplish more for health, comfort, and efficiency than any other activity—civil, ethical, or philanthropic—that ever came down the Pike of Time.

And when the majority of tax-payers in the country have been converted to this fact, and act accordingly, a new era of physical, mental, and moral progress will dawn for Americans.

Free Dental Clinics

Give Children the Same Chance we Now Give Bugs and Pigs. Indeed, it would seem only rational to believe that a government which has spent millions to save the valuable lives of hogs, to find bugs that would eat large numbers of other bugs, or to stamp out foot and mouth and intestinal disease in cattle, might take some slight human interest to overcome infection, decay, and degeneration in the most important of all crops—our children crop.

In most municipalities of this country it is required that children be vaccinated before being permitted to attend school. And yet, in most parts of the country, there is not the slightest attention paid to children whose breath is a blight, who smear pus all over the neighbourhood, who are septic from top to toe—and mostly from conditions which have their origin in the oral cavity.

The Famous Forsyth Dental Infirmary. Among the most progressive of all the institutions, incorporating departments of oral hygiene, is the splendid Forsyth Dental Infirmary, of Boston. In their annual Report, recently published, there is no more important item than that which demonstrates the hope of the directors and trustees to

continue to reduce the age limit at which children shall be admitted for treatment by the Infirmary.

In the beginning of their work, the average age at which children were eligible for oral attention was twelve years. This was later reduced to eight years. But it is now planned to reduce the age still lower—to five or six years. The Report reads:

> If the child's mouth is thoroughly looked after at the age of six years, the work is preventive; but if the child's mouth is not inspected until it is eight years or older, the work becomes reparative, because the sixth-year molars have already gotten in their deadly work.

How They Do it at Rochester. At the splendid Rochester Dispensary—founded by Mr. George Eastman, of Kodak fame—there has never been an age limit. Children have been brought in for treatment as early as eighteen months of age.

It has been noted that children of even three or four years of age, are losing or have lost their entire temporary set of teeth—due in large measure to the so-called "white decay." The only treatment outside of reparative attempts in these cases consists in changing the diet of the children—

recommending their parents to put them on whole wheat bread, and other tooth- and bone-forming foods, so as to aid Nature to build tooth structure for the permanent teeth that are coming in.

But it is only a Drop in the Bucket. However, splendid as is the work of the few dental clinics that have already been established, the number of children who can, at present, enjoy the advantages of such work, is pitifully small—as compared with the total number of children in every part of the country who stand sadly in need of such treatment.

The surface of such need has only been scratched, and the supply of dental clinics and skilled workers to operate them is frightfully inadequate.

How School Lectures Help. School lecturers in oral hygiene are also doing a splendid work in familiarizing children with the dangers of tooth-decay and tooth-rot. But this work is only in its infancy. It needs to be expanded, until every school in the country can have the advantage of these inspiring and helpful lectures.

In this connection it might be mentioned that Colgate & Co., and possibly other dental manufac-

turers also, are doing a praiseworthy and result-bringing piece of work.

They maintain, so I am informed, a corps of well equipped lecturers, who constantly travel about, delivering lectures on mouth hygiene in the schools throughout the country.

These lectures are interesting and highly informative, and afford hundreds of thousands of children an opportunity to become familiar with the grave dangers of oral neglect, and the correspondingly great benefits to derived from proper and persistent care of the teeth and gums.

The Dental Nurse—God Bless her! School nurses and prophylactic nurses are also doing a useful and indispensable work in health education. But here, as with school lectures and dental clinic facilities, the results are only fragmentary—as compared with the vast total of the work that remains to be done.

Why Dentistry Doesn't Hurt much Nowadays. One of the greatest aids to the popularizing of modern dentistry is the fact that progressive manufacturers of dental equipment, patient laboratory chemists, and careful, conscientious dentists have —all working together — evolved a system of

dental technique which robs dental work of its old-time horror, and renders tooth operations comparatively painless.

Nitrous Oxide and Oxygen Analgesia. One method that is employed successfully by many dentists is the "nitrous oxide and oxygen analgesia" method. By the inhalation of this gas, dentists are operating on patients sitting wholly conscious in their chairs, yet completely insensible to pain.

The appliance for administering the vapour consists of an elaborate arrangement of metal cylinders, shining gauges and valves, rubber bags, and a tube that terminates in a cup made to fit over the nose. By adjusting this tube and breathing through the nostrils the mixture is inhaled. Six to eight inhalations bring on a tingling sensation in the extremities, somewhat similar, only infinitely more mild, than that which follows slight electrical contact.

It Won't Work on All Patients. Not all patients, however, can be controlled in the analgesic stage. These are kept under complete anæsthesia, sometimes for an hour and a half. Some have been unconscious for five hours at a time. But

the absolute safety of the measure can be better realized when we remember that dogs have been kept completely anæsthetized with nitrous oxide and fifteen per cent. of oxygen for three days successively, without any harmful results.

The percentage of fatality is computed as one in a million. This is the more remarkable in that nitrous oxide and oxygen has probably been administered in scores of thousands of cases by unskilled operators, while ether and chloroform are usually given by skilled anæsthetists. Dr. Laird Nevious has given the gas almost one hundred thousand times without an accident, and Dr. Andrews (the first to use it) has never seen an unfavourable result.

It's Better to Have the Gases Warmed. Certain valves liberate the oxygen and nitrous oxide into the "mixing chamber." Here the gases are warmed to body temperature. Their ordinary temperature is about 20° Fahrenheit, or 12° below the freezing point, and in prolonged operations the thermometer sometimes settles to 10°.

This accounts for the irritating properties that erroneously used to be charged against the anæsthetic itself. From the mixing chamber the com-

pound is discharged into rubber bags connected with the nasal inhaler. The origin of this analgesia ("analgia" as some call it) is a golden leaf from the brilliant pages of dental progress. The story runs thus:

Since the introduction of anæsthetics, it was believed and taught that it was improper and dangerous to perform surgical operations before narcosis (complete unconsciousness) had been induced. Even to operate during the stage of light anæsthesia was not permitted; nothing short of deep unconsciousness was tolerated.

How Dr. Hewett Pulled his Own Tooth. So when first the tidings winged haltingly over the Atlantic that Sir James Young Simpson, in his clinics at Edinburgh Hospital, was using chloroform to dull the keen pains of child-birth, Dr. Austin T. Hewett, of Chicago, conceived the idea that the merciful fumes might be equally valuable in dentistry. Procuring a supply of chloroform from London, at a cost almost ruinous to his slender means, he began to experiment on animals with it.

It happened that at this time he was suffering from an abscessed upper incisor tooth. So he

took several inhalations of the chloroform vapour, and in that state of drowsiness which he afterwards called "obtundure," he forced a lance against that part of the gum covering the root of the tooth.

When he withdrew the instrument, he found much to his amazement, that the point had penetrated a quarter of an inch or more, and no particle of discomfort had been experienced. He then took his courage in both hands, carefully adjusted a pair of forceps over the incisor, breathed deep of the sweet pungency, and pulled his own tooth—absolutely without pain!

This was the first surgical operation ever performed under analgesia (if we except the mandragora and poppy of the ancients) and the first operation performed under chloroform in America.

But it Took Almost Fifty Years to Get it generally Introduced. Naturally, Dr. Hewett was enthusiastic; but, like every medical or surgical innovation, dental analgesia met with a sceptical and frigidly discouraging reception. Hewett continued to advocate and employ chloroform in his dental and surgical practice for more than fifty years, operating under every possible condition with "surgical analgesia," omitting only four or

five of the gravest and most complicated general operations for which he used the anæsthetic state.

But, except for the support of a few pioneers, the practice met with scant favour. It is only within a few years that analgesia has achieved general recognition. In fact, it is still in the swaddling clothes period, so far as any extensive use is concerned.

Abraham Lincoln Used it. Dr. Wolf, of Washington, D. C., relates that some time after the "Hewett method" had been introduced, a tall, raw-boned, awkward man, with a sad face and a kindly eye, came to his office to have a tooth extracted.

Just as the doctor was about to operate, the stranger said: "Wait a moment, please"; drew from his pocket a small vial, removed the cork, and inhaled deeply of a volatile substance for a minute. "Now you may proceed," he said, and opened his mouth.

The tooth was removed painlessly. The substance was chloroform; the patient, Abraham Lincoln.

"Laughing Gas." Six years later (1868), Dr. Andrews of Chicago added pure oxygen to "N_2O,"

as dentists and surgeons prefer to call the laughing gas, and attempted to perfect a certain, safe method of producing analgesia. The results were fairly satisfactory, considering the crudeness of his invention; but the profession still held coyly aloof from the new-fangled device.

Until, thirty years later, Dr. Charles Teter, of Cleveland, Ohio, began experimenting with the gases, and devised a contrivance for scientifically administering definite percentages of nitrous oxide and oxygen, thereby enabling the operator to analgesize the patient, or to carry him into deep and prolonged surgical anæsthesia, at will.

As to the comparative merits of nitrous oxide, chloroform, and ether narcosis, the American Medical Association reports that, as a routine anæsthetic, nitrous oxide and oxygen has a peculiar value, and in the hands of skilled anæsthetists the method is the best yet devised.

Preventing Surgical Shock. We know that in surgery the function of an anæsthetic is to inhibit pain; but really its chief and most important action is to prevent "shock." For shock is the grim factor that bludgeons most victims of anæsthetics out of existence.

No surgeon would now think of performing painful instrumentation without employing an anæsthetic to prevent this shock. And if surgical shock, why not dental shock? Operations made by the dentist in his everyday practice are equally as severe as scores of minor measures for which the surgeon employs narcosis. Exhaustion of the nerve centres, rather than the amount of structure involved, is what produces shock; and beyond certain limits, it is dangerous to submit even the robust to intense pain.

Why you Feel "all Used up" after a Painful Dental Session. After prolonged dental seances the nerve cells become exhausted. A condition that might be called dental fatigue supervenes—a state of the system that borders upon collapse or shock. In fact, it may be said to differ from shock only in degree.

And who among us has not experienced, on leaving the chair, that "all gone, completely used up" feeling? How many possess that Spartan fortitude which enables them to return without dread and anxiety for another siege with those grim-looking little instruments.

How the Japanese Used to Do it. And, touch-

ing this question, it is interesting to remember that the physics of shock were advocated, and to some extent used, in tooth extraction, prior to the introduction of analgesia.

The method commonly employed was for a patient to lie prone upon the floor—an able-bodied individual on either side of him. At a given signal he was quickly swung to a standing position. The head was raised more rapidly than the blood could follow it, and this produced a temporary anæmia of the brain, resulting in a fainting spell. During the few moments in which the victim was unconscious, the tooth was dragged forth.

The Japanese employed Jiu-Jitsu tricks for the same purpose. They produced insensibility by suddenly compressing the artery in the neck (the carotid) between the thumb and finger. This was very dangerous, because if the force happened to be applied too vigorously, the patient neglected to wake up.

This is not the case with modern methods. Hundreds of thousands of pain-deadening operations are made every year, without the slightest untoward results.

Procaine, the New Anæsthetic. The method

which has perhaps most general use nowadays, however, is the "local"—with cocaine, novocaine (or procaine, to call it by its non-German name).

The latter anæsthetic is now being used by the foremost surgeons in Europe and America for many operations which, before the introduction of this anæsthetic, were performed under cocaine, ether, or chloroform. It is a perfectly wonderful local anæsthetic, much more powerful than cocaine, and seven times less poisonous.

This anæsthetic is distinctly local in its action. No ill effects follow its use, when administered by an expert. It does not produce soreness nor sloughing of any kind; while it protects completely against all sensation of pain—no matter how sensitive the teeth—and while the patient is wide awake and thoroughly conscious of everything that is going on.

Injected Directly into the Main Nerve. Astonishingly successful results have been secured by the practice of injecting the local anæsthetic directly into the main nerves which supply the teeth—after the technique introduced in 1914.

Eighty Million Extra Teeth Every Year. There are upwards of eighty million artificial teeth made in this country every year, each one of which goes

to replace a tooth, which, with proper care, might have lasted a lifetime.

This is the crime of carelessness, the neglect of the natural. There is no excuse for it, except ignorance. And soon, it is to be hoped, we shall no longer have even this excuse.

When this day arrives, men and women will demand and receive dental attention as they now demand and receive any other form of prophylactic attention. And when they do this, the Golden Age of Humanity will have been ushered in—and a very considerable source of suffering, crippledom, and life-shortening will be banished forever to the limbo of the cruel things that were.

NOTE

THE human document contained in the following pages was written by a patient of mine, and printed in the May, 1918, issue of the *American Magazine*. It is republished from the *American Magazine* at his suggestion, and through the courtesy of the editors of the Magazine.

My patient's experience is typical of that of thousands of other men and women who suffer from obscure diseases that apparently baffle diagnosis.

Such people, while seeking diligently to determine the cause of their troubles, neglect a thorough inquiry into the condition of their teeth—and so remain unhealthy, unhappy, and discouraged.

It is my hope that this very human story may fall into the hands of someone who will read in the experience of the writer of this article a repetition of his own experience, and may, by its message, thus perhaps discover his way back to health.

Teeth and Health

The editors of the *American Magazine* tell me that this article, when printed, elicited a tremendous flood of inquiry and that permission to reproduce it has been granted to a number of dental magazines, and to dentists in various parts of the country. I am sure that every physician, and all of my fellow-practitioners, as well as thousands among the laity who are interested in the matter of increasing the health and efficiency of their fellow-men, will rejoice in its wider circulation, incorporated in this little book, as a contribution to popular knowledge.

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HOW I FOUND HEALTH IN A DENTIST'S CHAIR

THIS is the first time in sixteen years that I have allowed myself to talk about my "symptoms." Sixteen years ago, after a great specialist had assured me there was "nothing organic the matter" with me, I made up my mind that however much my ill health might spoil my own life, it should not spoil the lives of others.

I am breaking that resolution because I think I have discovered what is the matter with half the people of the world, who without being sick are more or less constantly depressed and troubled with pains that are not "organic" and, therefore, apparently beyond medical help. I believe I can describe the symptoms of at least a million men and women in these United States who will recognize in my story a counterpart of their own.

I come of moderately well-to-do parents. My ancestors on both sides lived wholesome, self-respecting lives. None of them passed away much before eighty. How it could come about that I should "enjoy poor health" seemed a mystery.

I passed through the usual succession of children's diseases in mild form, and except for them I cannot remember ever having had the ministrations of a

physician in my first fifteen years. I *can* remember being taken by my mother to the dentist when I was six years old.

Long before this I had been initiated into the use of the toothbrush—so long, in fact, that it seems almost that I must have been born with a toothbrush in the place of the traditional silver spoon. I feel it necessary to set this down, partly out of justice to my parents, and partly because I understand that a late medical theory ascribes all tooth-decay to lack of oral cleanliness. I am the living proof that this theory will not hold water.

I can recall my first appointment with a city dentist clearly enough, even to the very words he spoke. I opened my mouth, he poked his instrument here and there for a brief minute, and, turning to my mother, in accusing tones he said to her:

"Mrs. Elkins, there's a *pile* of work to be done."

He began by pulling three teeth. Six or seven years of hard, conscientious brushing out of eleven years of life—and this was the reward.

It was during these years of my early teens that I first remember a certain deficiency of vitality, a lack of endurance that left me tired and ready to go home and to bed while other fellows were still fresh. It was not sufficiently pronounced to be noticeable to my people, nor to handicap me at school.

So I made my way up through high school and into business, living a virtuous and more or less unhappy life. I had everything that ought to make a man happy—a good home, congenial work, and the ap-

pearance of splendid health. Indeed, I have never lost that appearance: it seems to be one of the curiosities of a condition like mine that a man can look the perfect picture of health while feeling utterly miserable. Knowing this, I often wonder what tragedies are hidden behind rosy cheeks and eyes almost clear.

My trouble was, first of all, that I was never really rested. I slept fairly well, but I would get up in the morning almost as tired as when I went to bed. My wife sometimes leaps to the floor and stretches her arms above her head to greet the new day, and exclaims, "I could eat the world!" I have never in my whole life felt that way. Generally I have risen rather blur-eyed with a kind of grim resolve to make my strength equal to the day's burden, somehow or other. And many a morning I have lain on my pillow, watching the rays of the sun push their way through the window and spread and dance, and have pictured the sunlight as a kind of implacable enemy.

Usually this tired feeling would pass off by the time I had eaten breakfast, and I would reach my office with a fair amount of energy and determination for the job. But after an hour or two all that energy would have used itself up and I would be down to mere nerve again. It was as though Nature had given me a man's size body, and a brain for a man's size job, but had equipped me with a reservoir that would hold only a child's energy.

My people had never believed much in doctors. I complained to them once or twice about my feelings,

and they brushed the complaint aside as being a product of an unduly active imagination. They had no time or money to squander on the health of a boy who cost as much to feed as I did and who looked so perfectly well.

We had moved from the city to a suburb, and our new dentist, a conscientious young fellow, was honestly concerned at the way in which my teeth persisted in going to pieces, in spite of all his care and my vigorous consumption of tooth powder and washes. He asked me questions about my health, and sought by putting litmus paper in my mouth to determine whether the saliva was acid or alkaline. So far as I could see, there was no reaction visible on the paper; but he believed that there was something the matter with my stomach which caused an acid condition in the mouth.

My people listened to his report, though they had paid no attention to my own; and on his suggestion I was taken to doctors of various sorts.

Looking as well as I did, I received a superficial examination, a slap on the back, and an injunction to get more fresh air in my lungs, drink more water, and think less about my health. So my youth passed, and manhood came to me, and found me with several hundred dollars' worth of dental work in my mouth, a tired body, a chastened spirit, and a conviction that I suffered from some disease such as no man had ever had before, since the doctors seemed unable to locate it. I even thought in those days of willing my body to a hospital, in order that an autopsy might

be performed and the obscure disease discovered and charted.

Many men who start out in life with frail constitutions grow strong and hearty between the years of twenty and thirty, so I cherished a latent hope that my experience might be of this character. My early twenties passed, however, with no visible improvement. I got on in business reasonably well, but I was far below real efficiency. I limited myself rigidly as to pleasures and even as to human contacts.

Every conversation with another man, every meeting of any kind, involves the expenditure of a certain amount of energy. There must be thousands of men and women in the world who bear the reputation of being unsocial and unresponsive whose fault lies in the fact that they simply have not the health to be otherwise.

As my income increased and I began to have money of my own to spend, the impulse would come to me occasionally to try what some new doctor might do. I remember one such impulse especially, because it was born of a violent love affair. I met the young lady at a summer resort. We paddled on the lake after supper and talked of many things, and among others of sports. She asked me what games I had played at school, whether I had been good at football, and whether I didn't simply adore golf. It was dark, but even under the friendly covering of night I could not summon courage to lie. I had to confess that I was not much on sports, and the confession cost me bitterness such as only youth can know. At that

moment I determined that I would be well if it took all the money I could earn in a lifetime.

The following day I made my way back to the city and started on my profitless round. I visited first a doctor whose reputation was known throughout the city as a diagnostician. It was his business to find out the hidden diseases that escape the probing of less expensive men. I told him my whole story—how I had been "born tired" apparently, and how, without being really sick, I was never wholly well.

He went over me carefully, I will say that for him; and when he concluded his examination, he said sharply:

"Nothing organic the matter with you. You've overworked; you're nervously tired; you haven't reserve power enough to carry you. The thing for you to do is to see a good nerve man. A man like Coburg, for instance. I'll give you a card to him; he'll fix you up in short order, if I'm not mistaken."

So I journeyed to Coburg, who rolled back my eyelids and looked at my pupils, tapped my knees with a little hammer to see how my "reflexes" responded, asked me questions of various sorts, and concluded by giving me a prescription for two kinds of tonic, and a suggestion that I see an eye man.

I felt a good deal encouraged after my visit to that nerve man. He is one of the two or three leaders in this field in America; the prescriptions which he gave me were very expensive, which increased my faith in their potency; and, finally, his suggestion about an

eye specialist sounded promising. When the eye man gravely informed me that he had located a "slight astigmatism" and that I must wear glasses, I could have leaped for joy.

The hope that sprang into my heart after my visits to these three very great and costly men vanished rapidly, leaving me sunk even lower in the slough of despond. Until then there had been some possibility that wiser doctors would discover trouble where the general practitioners had failed. Now I had been to the very best men, and they, too, had found nothing. There was no use in hoping further; the only thing left was a dull, dead determination to stick it out and to do a man's work, with health or without it.

All the world, as someone has said, is divided into two classes—those who have rheumatism and those who are going to have it. It was a year ago last spring that I had my first visit from the common enemy of mankind. Only a preliminary twinge in my right knee, but it was enough to plunge me into gloom.

It was while I was in this state of mental depression that I ran into a friend at the club who had been a notorious sufferer from muscular rheumatism, and was amazed to find him apparently well.

"Those baths must be great things," I said, for I knew he had been buried in mud for a month.

"They're all right," he replied; "but it wasn't baths that did it for me. It was teeth."

"Teeth!" I exclaimed, "What do you mean? Teeth cause rheumatism?"

"Among many other things that they cause, rheumatism is not the least. There's hardly anything they don't cause, as doctors have just discovered."

"That sounds crazy enough to me," I said. "Why, look at me! I have rheumatism, and I've been to a dentist twice a year regularly ever since I was six years old."

"Ever have your teeth X-rayed?" he asked.

"No."

"Well, take my advice and go and do it. Do it this afternoon."

I spent that afternoon in the office of a dental X-ray specialist who does nothing but photograph jaws all day long. When about four o'clock he handed me the films on which my oft-filled teeth were pictured, he looked at me with surprise mingled with something almost like pity.

"I've kept a duplicate set of these," he said. "I want to show them at our dental society. To look at you, one would suppose you are perfectly well, yet these pictures uncover trouble enough to have put a horse to bed."

"But I've never neglected my teeth," I exclaimed; "I must have a thousand dollars' worth of dental work in them this minute. What do you advise?"

"I advise you to take those pictures to the best dentist in the city," he answered. "Have him open up every tooth in your head and see just what is the condition of the root. Some he'll have to pull; others he may be able to save. I've noted my conclusions on my report; you can take it to him and see what he says."

Found Health in a Dentist's Chair

I hunted up the best dentist in New York. His prices were twice as high as any I had paid before, but when he began work I realized *why* they were high. There may be a lot of bluff in the learned professions; there may be isolated cases where lawyers and doctors and dentists are charging exorbitant fees, not because they have unusual ability but because they have unusually high rent. There doubtless are some such cases, I say, but my experience has been that where a man is getting big money for his work it is generally because he knows a whole lot more than the man who is doing the same work for less.

All my life I had been paying for what I supposed was first-class dental work, only to discover now that it was so imperfect as to be the root of all my trouble. Crowns in my mouth were leaking and secreting food that formed poisons; root canals, as the X-ray showed, had been only partially filled, resulting in abscesses. There were at least six so-called blind abscesses at the roots of my teeth—called blind because their presence was not indicated by any external swelling, and could be discovered only by the X-ray. Yet any one of them was draining sufficient poison into my blood to corrupt my whole system.

Scratch your finger; let a dentist infect it with even a tiny particle of pus, and it will swell and fester. What, then, must be the effect of pus continually generated and constantly being drained into the system from a half-dozen infected teeth?

It is not pleasant to talk about; and I need not go into any further detail. Suffice it to say that I had

every crown in my mouth removed, every dead tooth opened up and re-treated (four could not be treated and had to be pulled), and new work put in from start to finish, every bit of it checked and tested, as we went along, by the X-ray.

That was two years ago, almost, and from the day that the work was completed until now I have never had the slightest touch of rheumatism. I eat more heartily, sleep better, and have far more vitality and joy in living than ever before in my life.

A woman came to my dentist while I was being treated. She suffered from neuralgia. There were no cavities in her teeth apparently, and she had been examined by various physicians, none of whom could locate the cause of her trouble. I saw the dentist take an X-ray of her teeth on the side of her face where the pain occurred, and watched him develop it. There, as plain as day, lying across the roots of three of her teeth was a fourth tooth that had never come through. It was a bad job removing that tooth, but the woman has had no trouble since.

A man in an office near mine suffered for years with his eyes. He had been treated by a first-class specialist, but in spite of everything his eyes would become terribly inflamed once or twice a year. Finally, as a last resort, the doctor sent him to a dentist. The X-ray showed that four of his teeth were causing all the trouble. They were to all appearances perfectly sound, and he hated to lose them. But he has no eye trouble since they came out.

Les Darcy, the Australian prize ring champion,

came to this country as a perfect physical specimen. A few months after his arrival he had an attack of rheumatism. He was taken to a hospital, examined, and it was found that every tooth in his mouth was decayed. He died two weeks later.

I could go on citing instances almost without number. They have all tended to form this conclusion in my mind: If I were called upon to find out what was the trouble with a railroad, I would start to look *first* at the terminal and freight yards, where all the traffic enters the system, and if I were ever to suffer from ill health again I would begin first to inquire whether, perhaps, the trouble did not originate in my mouth, where all the food and air that get into my system is received. Doctors themselves have come only recently to recognize the importance of the teeth; and to many laymen the claims that are made for the possible effects of bad teeth must seem wildly exaggerated. Who could imagine, for example, a pain in the knee being cured by the extraction of a bad molar? Yet I know just such a case.

Indeed, I am ready now to believe almost anything, having proved by my own experience that one may have been faithful to the dentist all his life, and yet find under the X-ray conditions sufficient to cause any disease from dyspepsia to housemaid's knee. If you do not know what's the matter, and if the doctor, wagging his head wisely and telling you that there is no organic trouble, doesn't know what's the matter either, go and get your teeth X-rayed. This is my

advice; it cost me more than thirty years of suffering and hopelessness. I pass it on in the faith that to many others, in whom hope is fast evaporating, it may prove a guide to the Promised Land; that they may discover, as I did, that the health they seek is waiting for them in the dentist's chair.

INDEX

A

Acid fermentation, 83
Acid food, 65
Adenoids, 94
Albuminoids, 39
Alkaline mouth wash, 200
American Magazine, 245
Ammonia, 77
Ammonol, 172
Analgesia, 237
Analgia, 237
Anæmia, 130
Anæmia, pernicious, 126
Angle, Dr. Edward H., 90
Antiseptics, 205
Appendicitis, 127
Apples, 49
Arteriosclerosis, 130
Arthritis deformans, 125
Artificial teeth, 243
Astigmatism, 134

B

Baby's teeth, 53 *et seq.*
Backward children, 93
Bacterial vaccines, 119
Baking soda, 200
Baldheadedness, 170
Bananas, 49
Barker, Dr., 126
Barnard, Dr. Harry C., 215
Beauty lotion, 159
Beauty specialist, 158
Beef juice, 65
Billings, Dr., 123, 139
Binet-Simon tests, 93
Biting exercise, 56
Blackberries, 49
Bladder trouble, 183
Bleeding gums, 204
Blind abscesses, 178
Blood alkalinity diminished, 117
Blood-vessel degeneration, 129, 149
Boils, 159
Bone deformities, 61
Boric acid, 79
"Breakfast foods," 24, 36
Breast-fed babies, 64
Breast feeding, 40
Breathing, 96
Bright's disease, 117, 124, 126
British Dental Association, 72
Brown sugar, 86
Brushing the teeth, 14
Buttermilk, 46

C

Calcium, 24, 51
Calcium salts, 29
Campho-phenique, 76
"Candy age," 97
Carbohydrates, 38
Carbolic acid, 205
Carbuncles, 159
Caries (see Dental Caries)

Index

Carrell, Dr., 202
Castor oil, 60
Casein, 31
Cautery Point, 145
Cell salts, 25
Cementum, 54
Cheese, 49
Chest development, 105
Chewing gum, 212 ff.
Chlorate of potash, 205
Chlorate of potassium, 65
Chlorazene, 202 ff.
Chlorine, 37
Chorea, 169
Clabbered milk, 46
Cloves, oil of, 76
Cocaine, 243
Colds, 130
Colon bacillus, 132
Cordes, William, 73
Cottage cheese, 46
Cotton, Dr. Henry A., 123, 131, 143
Coughs, 130
Cow's milk, 40
Culture media, 206
Curds, 39

D

Dakin's solution, 118, 158
Dates, 49
Davis, Dr., 123
Dead teeth, 181
Deciduous teeth, 55
Dehydrated vegetables, 49 *et seq.*
Degerminated corn-meal, 36, 40
Delinquents, 162
Dental arches, 93
Dental band, 53
Dental caries, 174
Dental clinic, 217
Dental dispensary, 217 *et seq.*
Dental film, 207
Dental floss, 25, 79, 208
Dental manufacturers, 215
Dental nurse, 234
Dental pastes, 199
Dental placques, 154
Devitalized teeth, 115
Diabetes, 117, 124
Diarrhœa, 56
Ductless glands, 25
Dunbar, Prof. L. L., 76
Duodenal ulcers, 124
Dyspepsia, 130

E

Ear trouble, 171
"Eating To Live Long," 121
Egyptian mummy, 175
Emetine, 120
Epilepsy, 57, 166 *et seq.*
Epithelial cells, 149
Essential oils, 205
Eye trouble, 170

F

Fermented milk, 46
Figs, 49
Fisk, Dr. Eugene Lyman, 120, 141, 160, 183
FitzGerald, Dr. William H., 130, 145
Fletcher's carbolized resin, 76
Focal infections, 123 *et seq.*, 131–133, 182
Forma-cresol, 144
Foote, Dr. A. Freedman, 72
Forsythe Dental Infirmary, 71, 231
Free dental clinics, 228 *et seq.*
Fruit acid, 214
Fruit juices, 47

G

Gas formation, 214
Gastric ulcer, 124
Gastro-intestinal infection, 133
Gelatine, 206

Index

Germs, 116
Gingival inflammation, 112
Gingival tissues, 113
Gout, 174
Grape fruit, 48
Gritting the teeth, 82
Gums, 56, 57 *et seq.*, 111, 122
Gum boil, 123

H

Hartzell, Dr., 141
Haskin, Dr. William H., 184
Hastings, Dr. T. W., 125
Hatfield, Dr., 62
Headache, 125, 172
Heart disease, 129
Heart symptoms, 140
Hewett, Dr. Austin T., 237
Hills, Kathleen, 159
Hobnail liver, 126
Homes, Oliver Wendell, 23
"Home treatment," 174
Hyatt, Dr. Thaddeus B., 181
Hydrogen-dioxide, 59, 201

I

Ice, 57
Ill-fitting crowns, 113
Impacted molar, 195
Impacted teeth, 70, 173
Improperly constructed fillings, 113
Improper alignment, 12
Incisors, 55
Incorrigibles, 12
Infected teeth, 125
Insanity, 94, 130
Intestinal disturbances, 54
Intestinal putrefaction, 54
Iodine, 118
Iron, 36, 63
Irregular teeth, 68, 71

J

Jam, 51
Japanese tooth pulling, 241
Jiu Jitsu, 242
Joints, inflammation of, 125
Juvenile Court, 12

K

Kidney disease, 151
Kraepelin, Prof., 13
Kumyss, 46

L

Lactation, 33
Lancing gums, 60
"Lantern jaws," 91
Lateral incisors, 55
Laughing gas, 239 ff.
Lawton, Dr. James A., 194
Life Extension Institute, 120, 157, 182, 198
Lime salts, 84
Lincoln, Abraham, 239
Listerine, 60
Lime starvation, 25
Lip biting, 102
Liver, 125
Lymphatic circulation, 94

M

Macaroni, 49
Magnesium, 37
Malarial poisoning, 174
Malnutrition, 130
Malocclusion, 109, 114,
Manganese, 63
Manhattan Eye & Ear Hospital, 184
Mayo, Dr. C. H., 160
Mazola, 30
McCollum, Dr. E. V., 26, 61
Meats, 24
Membranous bands, 54
Meningitis, 56
Menthol, 197
Metropolitan Life Insurance Co., 181, 219

Index

Milhoff, Dr. H. D., 222
Milk, 43 ff.
Milk of magnesia, 43 ff., 78, 118, 201
Milk modification, 43 ff.
Milk sugar, 43
"Milk teeth," 18
Miller, Dr., 128
Mineral salts, 26 ff., 38 ff., 86, 87
Mitchell, Dr. James R., 71
Mixture, the "1–2–3," 120
Molars, 55
Mothers, 38
Mother's milk, 29 *et seq.*
Mounier, Dr., 170
Mouth bacteria, 128
Mouth-breathing, 69
Mouth toilet, 80
Mouth washes, 198
Mud baths, 253
Mucous membrane, 105

N

Nervous exhaustion, 136
Neuralgia, 125, 171, 191
Neuritis, 125
Nitrous oxide, 235
Normal occlusion, 70
Northampton clinics, 73
Novocaine, 243
Nursing bottles, 59
Nutritional disturbances, 149

O

Odontalgia, 77
"One-sided chewing," 75
Oppenheim, Dr. Albin, 92
Oral hygiene, 113
Oral prophylaxis, 79, 199
Orange juice, 45, 47, 64
Organic phosphates, 36
Orthodontia, 89 *et seq.*
Orthodontist, 19
Oxygen, nascent, 208

P

"Pacifiers," 74, 102
Paralysis, 169
Pasteurized milk, 31
Pathogenic germs, 111
Peaches, 48
"Pearled barley," 37
Pellagra, 26
Pepsin, essence of, 46
Pericementum, 54
"Period of greatest decay," 80
Periosteum, 111
Phagocytes, 165
Phosphates, 24
Phosphorous, 37
Phosphorous starvation, 25
Pineapple, 49
Polished rice, 37
Polypi, 94
Poor mastication, 68
Porter, Dr. William H., 121, 146, 172
Potassium, 36, 48, 51, 63
Procaine, 242
Prophylactic toothbrush, 164
Proprietary foods, 64
Proteids, 38, 39
Prunes, 49
Psychological tests, 15
Pus, 111, 130
Pyorrhœa, 70, 99, 109 *et seq.*, 221

R

Ravitch, Dr. M. L., 127
"Rabbit face," 100
Raisins, 49
Raspberries, 48
Ream, Dr. Frederick K., 166
Refined sugar, 27 ff.
Reflex pains, 174
Rheumatism, 124, 125, 133 ff., 253
Rickets, 32, 61
Riggs, Dr. Charles H., 189

Index

Rochester Infirmary, 232
Roemer, Dr. J., 190
Roosevelt, Col. Theodore, 163, 176
Root canals, 178, 179
Rosenow, Dr., 123, 127, 128

S

Salads, 50
Saliva, 113
Sallow complexion, 16, 137
School lectures, 233
Sciatica, 173, 194
Scurvy, 26, 63
Secondary foci, 126
Sensitive dentine, 78
Septum, 105
Serumal calculi, 113
Silica, 37
Simpson, Sir James Young, 215, 237
Sixth year molars, 72, 73, 97, 98, 161
Skin eruption, 41, 59
Sleep, 34
Sodium, 36
Soda bicarbonate, 200
Spaghetti, 49
Spasms, 59
Spinal curvature, 70
Steinberg, Dr. S. I., 127
Stomatitis blisters, 204
Strawberries, 49
Sugar, 24, 83 *et seq.*
Sulphur, 37
Supernumerary teeth, 81
Syphilis, 174

T

Tartar, 75, 117
Teter, Dr. Charles, 240
Tetter, 41
"Therapy zones," 77
Third set of teeth, 81
Thomas, Dr. K. H., 143
Thumb-sucking, 74, 102
Tic Doloreaux, 71
Tired feeling, 249
Tonsils, 127
Toothache, 76
Toothbrush, 79, 208
"Toothbrush drills," 198
Tooth conservation, 52
Tooth enamel, 85–113
Tooth pastes, 206
Tooth-picks, 208
Traumatic injury, 109
Tuberculosis, 117

U

Ulcerated gums, 58 ff.
Undegerminated corn products, 87
Unpearled barley, 87
Unpolished rice, 87
Unscoured oats, 87
Upson, Dr. Henry A., 95
Urine, 65
Uterine neuralgia, 173

V

Van Wincle, Dr. T., 73
Vitamines, 64
Voice-production, 96

W

Wallin, Dr., 14
Water, 41
Water, distilled, 42
Weaning, 32, 34
Wells, Horace, 215
Westlake, Dr. Albert, 35
Whey, 45
White bread, 24, 36
White of egg, 65

Index

Whole wheat bread, 87
"Whopper-jaw," 101
Woodyat, Dr., 123

X

X-ray, 137, 156, 173, 176 *et seq.*, 184, 254 ff.
X-ray clinics, 179
X-ray diagnosis, 179
X-ray examination, 170

Z

Zone therapy, 77, 186 *et seq.*
Zoolak, 46

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